Where does the inequity lie?
Trends in the Use, Access, and Impacts of UC Berkeley Campus Green Spaces on Undergraduate Students

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ABSTRACT

There is a large array of literature that assesses the relationship between socio-economic factors and racial identity in relation to the access and use of community green spaces. However, new studies are beginning to show that there are more nuanced biases and factors that influence how people interact with green spaces when there is equal access. In this study, I address the underrepresented college student population and analyze the role race, previous exposure and access to green spaces, family income, and psycho-social factors play in determining how and why students access and use college green spaces using a qualitative and quantitative survey matrix. I found that the college environment removes socio-economic limiting factors as barriers to access and use, but that race, previous exposure, and psycho-social factors still influence how students interact with campus green spaces. My results will benefit other researchers on the current gaps that exist in our understanding of the relationship between culture, society, and green spaces and assist them in how to better prepare further study. My results will also help university officials worldwide on the importance of campus green spaces for students' physical and mental health, as well as provide them with guidance on how to address campus green space use inequities and inaccessibility.

KEYWORDS

Undergraduate students, greenspace, trends in use and benefit, factor of influence, barrier factors

INTRODUCTION

History of Uses of Green Spaces in Urban Areas

Green spaces within urbanizing and urbanized regions of different societies are not a new phenomenon or aspect of urban planning. Urban open spaces have been "critical sites of cultural, political, and economic life from early civilizations to the present day" that provide cultural ecosystem services (Stanley et.al, 2012). Green spaces in cities have existed since the hanging gardens of Babylon to the Campus Martius, a vibrant parkland that had been transformed by Augustus, in Rome. The Romans have been accredited as the first civilization to acknowledge the benefits of rural and wild features of nature within cities, coining the term 'rus in urbe' to describe having the country within a city. In Rome, such spaces included 'horti', urban villas within a park and were signs of wealth within the civilization, peaked by Emperor Nero's palatial grounds that included vineyard, tilled grounds, a forest, and an open menagerie (Rambles, 2016).

It could be argued that the benefits Romans observed from 'rus in urbe' was more aesthetic and a spiritual representation of wealth and status rather than the utilitarian benefits of such spaces that are highly researched and desired from modern green spaces. This would be similar to other ancient civilizations like ancient Chinese, west Asian, Greek, Aztec, Egyptian, Persian and Islamic civilizations who have been recorded including extravagant gardens and forests in wealthier areas rather than in open public spaces for all citizens to enjoy and engage with.

In Britain, the benefits of rural spaces in highly populated towns were recognized as early as 1618 when a Commission on Buildings was formed to oversee the creation of Lincoln's Inn Fields, the first open access green spaces in the country as the only preceding green spaces had been royal hunting parks (Rambles, 2016). Hoever, it was not until the Industrial Revolution that urbanized areas began to implement the use of green spaces for health-based reason rather than aesthetic or socially based reasons. Following 19th century development and industrialization in Britain, open and green spaces were referred to as a city's 'green lungs', as coined by William Pitt the Elder, and were viewed as a vital component of city and civilization health (Rambles, 2016). These spaces became so important in industrialized Britain that in 1833, the Report of the Select Commission on Public Walks was established to "advocate for the provision of public parks in cities as an important factor in improving urban living standards" (Rambles, 2016).

Impacts of Green Spaces

Urban green spaces are important for urbanized regions due to the physical and mental health benefits they offer residents. Green spaces were first introduced into society as a health-based mechanism to primarily improve upon the sanitation and aesthetic of a populated area. These spaces and service were later converted and adapted to serve as a cite for medicinal relief, physical exercise and recreation, and an area of mental respite and inspiration for urban residents. While there was little research conducted at the time to explain why these spaces were important to residents, the cultural and social climate surrounding these spaces led to an unconscious understanding of these spaces as areas of healing. One large public health service green spaces offer that has been long identified is its function in the built environment as an outside location for physical activity. The impacts of exposure, access, and use of green spaces have been largely studied and show an array of causational and correlational links to improved mental and physical health. Exposure to green space has been deemed comparable to family history and parental age when predicting mental health outcomes, with only socioeconomic status acting as a stronger indicator (Bedimo-Rung, 2005; Enegmen, 2019; NASA, 2019; Rook, 2013).

Numerous medical health studies have shown that physical activity in green spaces can improve cardiovascular health, mental health, neurocognitive development, and general well-being (Braubach, 2017; Owen et al., 2010). An increase in physical activity have also been linked to the decrease in abundance and prevention of obesity, cancer, and osteoporosis and the presence of attractive and accessible urban environments (Braubach, 2019; Bedimo-Rung et al., 2005; Owen et al., 2010). There is a growing collection of studies and evidence that show “green exercise and physical activity in green space is more restorative and beneficial to an individual’s health than physical activity in non-natural environments” (Barton and Pretty 2010; Bodin and Hartig 2003).

A large portion of the available evidence linking an association between green space and physical activity levels have three domains of influence and interaction: work, active transport, and leisure (Braubach, 2019; Hartig et al., 2014). Numerous of these studies, conducted in several countries, have observed that increased physical activity, recreational walking, and an overall reduction in sedentary time is directly associated with access to and use of green spaces across age groups within a city’s residential population (Braubach, 2019; Epstein et al. 2006; Kaczynski and Henderson 2007; Kaczynski et al. 2008; Sugiyama and Ward Thompson 2008; Cochrane et al.

2009; Almanza et al. 2012; Lachowycz et al. 2012; Astell-Burt et al. 2013; Schipperijn et al. 2013; Lachowycz and Jones 2014; Sugiyama et al. 2014; Gardsjord et al. 2014; James et al. 2015; Sallis et al. 2016). Several of these studies also noted a relationship between mental health and green space use and access aside from the physical health benefits.

In a nation-wide study in Denmark covering more than 900,000 residents, it was observed that children who grew up with the lowest levels of green space had up to a 55% higher risk of developing a psychiatric disorder (Enegmen, 2019). These results are independent from the effects of other risk factors, showcasing a strong association between cumulated green space exposure and risk of mental health disease prevalence (Enegmen, 2019). Other supporting studies have also observed a dose-response relationship to mental and physical health to green spaces, where higher doses of green space exposure are associated with better mental health. These findings are further supported by other studies that have identified causational links when looking at the long-lasting effects of moving to greener areas permanently (Enegmen, 2019; Shanahan, 2016; Alcock, 2014).

Although the mechanism of effect may be uncertain, potentially related to either physiological pathways and/or psychological pathways, green spaces have been proven to serve as a mitigation mechanism from the negative influences of one's built environment (Enegmen, 2019; Hartig, 2014). Green spaces promote mental health by supporting "psychological restoration, encouraging exercise, improving social coherence, decreasing noise and air pollution that can affect cognition and brain development, and improving immune function" (Enegmen, 2019; Hartig, 2014; Rook, 2013). This serves as evidence to the theory that psychological restoration may be the "strongest protective mechanism" a green space can offer an individual and community (NASA, 2019).

In the past decade, there has been a growing body of research that shows that frequent interactions with green spaces are associated with physical and mental benefits amongst a variety of populations, primarily focusing on children and workforce-age adults (Bogerd, N. V. D., et al, 2018; Braubach, M. et al, 2017; Hipp, J. A., G. B. Gulwadi, S. Alves, and S. Sequeira, 2016; Holt, E., et al, 2019; Mcfarland, A., T. Waliczek, and J. Zajicek, 2008; Seitz, C. M, et al, 2014; Tiyarattanachai, R., and N. M. Hollmann, 2016; Wood, E., et al, 2018). The studied types of green spaces in urban environments are primarily parks, playgrounds, and residential green spaces, which have then been observed to reduce morbidity and mortality and improve quality of life in

residents (Braubach, M. et al, 2017; Hipp, J. A., G. B. Gulwadi, S. Alves, and S. Sequeira, 2016; Holt, E., et al, 2019).

Numerous epidemiological studies have linked green space exposure with reduced depression and improved mental health, reduced cardiovascular morbidity and mortality, reduced exposure to air pollutants, and reduced rates of obesity and diabetes to green space exposure (Braubach, M. et al, 2017; Hipp, J. A., G. B. Gulwadi, S. Alves, and S. Sequeira, 2016; Holt, E., et al, 2019; Mcfarland, A., T. Waliczek, and J. Zajicek, 20087; Tiyarattanachai, R., and N. M. Hollmann, 2016; Wood, E., et al, 2018). Some more recent studies have shifted focus from adult and elderly populations to researching the impacts green spaces have on college students, especially on the students' mental well-being as chronic stress amongst that specific population has increased (Hipp, J. A., G. B. Gulwadi, S. Alves, and S. Sequeira, 2016; Holt, E., et al, 2019; Tiyarattanachai, R., and N. M. Hollmann, 2016)

Issues of Equity

Unfortunately, green spaces have historically been linked to wealth and status: royal and noble families, as well as other wealthy members of society in civilizations throughout the world and timeline of human existence have largely been the sole benefactors of the physical and mental health benefits green spaces can provide. Economic status and social class (rank, caste, family ties) have been intrinsically tied to green space access, and these factors of influence were maintained under the increased industrialization, urbanization and globalization of society.

Despite the different historical contexts for each state and country, these spheres of equity overlap in various combinations throughout every society. The impact and influence of the upper class and historical engagements with green spaces has persisted into modern development and city planning practices. The relative degree of public accessibility of modern urban green spaces is closely linked to their cultural and economic functionalities (Grove, 2017; H. Akbari et al, 1970; Kuras et al, 2020; Nardone et al, 2020; Schell et al, 2020; Stanley et. al, 2012). In the United States, the distribution of green spaces is largely connected to the nation's history of systemic racism, growing rise in gentrification, and other socioeconomic inequities (Kuras et al, 2020; Nardone et al, 2020; Schell et al, 2020).

Social inequity, specifically the uneven distribution of resources and wealth is arguably one of the most characteristic attributes of a city (Schell et al., 2020). Bolstered by structural racism and classism, structural inequalities and inequities form the foundation of a city's infrastructure, governance, urban planning and development, management, and landscape heterogeneity (Kuras et al, 2020; Nardone et al, 2020; Schell et al., 2020). Public green spaces are public goods, and the addition of a new green space into a neighborhood has led to a phenomenon known as eco-gentrification, where the relatively wealthy benefit from said spaces (Richards, 2020). The stratification of wealth and property ownership has shaped the distribution and management of urban spaces (Schell et al., 2020).

Variations in household and neighborhood wealth are the most commonly studied social variables used to describe inter-city biodiversity distribution patterns, specifically within residential neighborhoods (Schell,2020; Kuras et al., 2020; Hope et al., 2003; Walker et al., 2009; Misha et al., 2018; Gerrish and Watkins, 2017). The luxury effect is a hypothesis linking household income and ecology, suggesting that urban biodiversity is positively correlated with neighborhood wealth, but in multiple cases, neighborhood racial composition is a stronger indicator of ecological distribution than wealth (Schell et al., 2020; Hope et al., 2003; Walker et al., 2009; Misha et al., 2018; Akbari et al., 1970; Jesdale et al., 2013; Watkins and Gerrish, 2018).

This phenomenon is global. Residential segregation is a potent form of social segregation characterized by a "physical separation of groups within cities and further compounded by the concentration of government and ecosystem benefits" (Mills, 2018; Schell et al., 2020). In the United States, this manifests as the ecological and social effects of redlining, with redlined neighborhoods having an average of 21% less tree canopy than non-redlined neighborhoods with a greater distance to other environmental amenities (Schell et al., 2020; Grove et al., 2017; Locke, unknown; Nardone et al., 2020). The legacy of redlining has remained a key driver in the establishment and design of urban landscapes across at least 37 cities in the United States (Schell et al., 2020; Grove et al., 2017; Locke, unknown; Nardone et al., 2020).

Green spaces in urban environments are not equally available or accessible, with socioeconomic inequities and inequalities in green space access contributing to inequalities and inequities in health, though this relationship has not been studied heavily within the college campus arena (Braubach, M. et al, 2017). Providing equitable access to green spaces is an important goal of healthoriented urban policies. The majority of existing studies discuss equity in terms of health

disabilities and disparities and pre-existing racial inequities and environmental injustices or focusing on biodiversity and coverage as the predicting factor for level of perceived benefits observed [1; Braubach, M. et al, 2017; 8]. Another challenge in addressing issues of equity are the contradicting conclusions on which demographic conditions serve as controlling and predicting factors for use, access, and perceived benefit; some studies concluded that there were no significant differences in responses by demographic conditions (age, gender, study level), while other past studies concluded that some demographic factors (gender, age, education level) influenced their level of environmental awareness (Tiyarattanachai, R., and N. M. Hollmann, 2016; Abdul-Wahab, S. A., and J. Abdo, 2010; Aminrad, Z., S. Z. B. Zakaria, and A. S. Hadi, 2011). Even when considering the different demographic factors of influence, many studies negate to address the different types of demographic situations like one's workplace opposed to their home or the college environment.

Studying Green Spaces on College Campuses

College students often are experiencing their first prolonged time away from home, causing them to be at high risk for potential stress and negative health impacts (Hipp et al., 2015; Atri et al., 2006; Dyson and Renk, 2006; Rawson et al., 1994). This change in environment, combined with an abundance of academic, social, and financial pressures can contribute to instances of chronic stress, impacting both the mental and physical health and well-being of students and leading to increased depressive symptoms (Hipp et al., 2015; Dyson and Renk, 2006; Rawson et al., 1994). Many students will sacrifice their physical and mental well-being to prioritize their academic success and performance.

Unit loaded and demanding course schedules an abundance of coursework, extracurricular activities, and jobs can result in a massive decrease in time spent outdoors without access to the green spaces on campus, even if they exist (Hipp et al., 2015). However, several studies suggest that simply having green spaces on campus is not enough; what matter is how the students perceive the greenness of their campus, and how that perception is then associated with the restorative effects they experience (Hipp et al., 2015). Results from this study show that those with "higher perceived campus greenness report greater quality of life, a pathway significantly and partially mediated by perceived campus restorativeness" (Hipp et al., 2015).

There is an established link between the frequency of campus green space use such as walking to class and a student's self-reported affective and cognitive quality of life (Hipp et al., 2015; McFarland et al., 2008). A photovoice study in the US found that undergraduate students prefer fully natural areas or natural areas with some built aspects around their campus compared to other types of open campus spaces (Hipp et al., 2015; Seitz et al., 2013). However, in the majority of the published literature studying the relationship between college students and their campus's green spaces, their questions focus on the 'what' and 'where', but not the who.

Studies focusing on college students have concluded that students on campuses with more green spaces are more satisfied and have significantly better perceived quality of life (including improved academic accomplishment in one study) compared to students of the same age and demographic on a campus with less or no green spaces (Bogerd, N. V. D., et al, 2018; ; Hipp, J. A., G. B. Gulwadi, S. Alves, and S. Sequeira, 2016; Holt, E., et al, 2019; Mcfarland, A., T. Waliczek, and J. Zajicek, 2008; Seitz, C. M, et al, 2014; Tiyarattanachai, R., and N. M. Hollmann, 2016). A common conclusion within these studies are policy recommendations for campus health professionals and administrators to consider and encourage the use of green spaces and green space programs to reduce student stress and improve their quality of life (Bogerd, N. V. D., et al, 2018; Braubach, M. et al, 2017; Hipp, J. A., G. B. Gulwadi, S. Alves, and S. Sequeira, 2016; Holt, E., et al, 2019; Mcfarland, A., T. Waliczek, and J. Zajicek, 2008; Seitz, C. M, et al, 2014; Tiyarattanachai, R., and N. M. Hollmann, 2016; Wood, E., et al, 2018). Yet there is still the issue of equity to consider, even within a shared space such as a college campus.

These studies work to establish links between student mental and physical health and the presence and prevalence of campus green spaces and students' perceptions of greenness. This perception and actualization of greenness is then linked to their mental and physical health outcomes. But which students are receiving these benefits? Which sub-populations of these samples contribute the most to the data? What other factors serve as limiting factors to access and benefit? Despite the increase in green space research within the academic community, the college and university study population are highly under-represented and researched.

With this paper, I address the following:

Central Research Question: Do green spaces on campus physically and mentally impact students, and what are the trends of use amongst those who do perceive benefits? If yes, how do they?

Sub Questions:

1) What are the perceived physical and mental benefits?

2) Is there a socio-economic and/or factor that impacts perceived benefits or utilization of green spaces?

3) What other trends/limits of access and benefits exist, if any?

I hypothesize that 1) green spaces on campuses improve students mental and physical health, even if passively, 2) that students from higher socio-economic families and backgrounds have had more exposure to green spaces outside of college and that they will report higher perceived benefits, and 3) that trends along racial lines and differences will follow trends in socioeconomic status (ex. A richer white person will be more likely to have had access and receive benefits from green spaces than a poorer white person, a richer person of Asian descent will be more likely to have had access and receive benefits from green spaces than a poorer white person, etc.).

To identify potential controlling factors and trends of use, access, and benefit amongst students, I will collect an array of quantitative and qualitative data that will be analyzed through a variety of analytical methods. This will include general demographic data such as age, race and ethnic identity, major, socioeconomic status; personal testimonials and longer written responses to open ended and non-leading questions about campus green spaces; strongly agree to strongly disagree statements for each respondent to answer about the campus green spaces, how they use them, how they feel before and after use or exposure, etc.; and hours spent weekly in the outdoors.

METHODS

Background

I decided fairly early on in the planning stages of my research that a survey component was essential. Surveys are well suited to the type of inquiry my research questions embody; they are

well suited to descriptive and cross-sectional studies and research. A survey would allow me to examine my study cite and 'situation' in relation to a variety of descriptive factors, including demographic, socio-economic, health, behaviors, opinions, and health characteristics. This breadth of knowledge is essential for my study as I am attempting to find under-research factors that act as barriers to green space access and use on college campuses. The ability to combine postal, closed, and open questions would also allow me to accumulate a large amount of data in a short period of time (Huang, 2017; Kelley, 2003; Ponto, 2015).

Survey Design

Due to the lack of research on what may be limiting factors towards student use and access, I designed my survey around three different subject blocks. Each block comprised of a varying combination of qualitative and quantitative questions that covered a semi-broad range of topics in order to encompass as many potential factors as possible. The full list of the questions I asked can be found in the Appendix.

Question Block 1: Campus Green Space Associations

This question block was a purely qualitative component. It contained two prompts that directed students to write the first five words they could associate with the terms 'Environment' and 'Green Space'. After these two prompts, I asked students for their familiarity with the term 'green space' with their answer options being a) I have never heard this term before, b) I have some idea what this term might refer to and mean, and c) I have heard this term before and am familiar with its definition and meaning. To ensure a standard of understanding for this term and the spaces it may refer to, I then provided respondents with the Oxford Dictionary definition "a green space is an area of grass, trees, or other vegetation set apart for recreational or aesthetic purposes in an otherwise urban environment". Directly following the definition, I then asked respondents to identify some locations on campus that came to mind when reading this definition.

Question Block 2: Trends in Use and Access Before and During College

This question block is the largest module of my survey and is comprised of both qualitative and quantitative questions. I inquired into the types of green spaces respondents had access to before college and during college. I allowed students an identical multiple-choice drop-down menu of different green space categories **(See Appendix)** for each age category, additionally allotting an Other option to identify any non-represented spaces. Between these questions, I used a Likert-type scale of 7 responses (Strongly Agree to Strongly Disagree, negating the Neither Disagree nor Agree option sometimes utilized in other studies) to discern whether or not respondents perceived access to a large variety of green spaces in their childhood (ages 0-12), adolescence (ages 13-17), and adulthood (ages 18+).

Question Block 3: Demographics

This Question Block focused on gathering a large variety of demographic data of the respondents. The majority of the questions focused on socio-economic factors, but there were also questions about their gender, age, major and minors, college, location (this is to be used for NDVI analysis), time spent outdoors as opposed to indoors, and so on (See the Appendix for the full list of questions). These categories were informed by previous literature to eliminate compounding variables and inform comparisons.

Drop-down Question Block for Disabled Students

Due to the history of ableism in green space design, use, access, and research, I made sure to include an additional question block in my survey specifically for respondents who identified as disabled (Stafford, 2019; UAB, 2020; Wood et al, 2018). These questions focused on their experience with campus green spaces, asking about whether or not they believe the spaces were designed with their condition(s) in mind or if the university was accommodating. I then offered them a chance to suggest ways university staff, administrators, and designers could better serve the disabled community and make green spaces more accessible and accommodating for them.

Caveats Concerning COVID

Due to the COVID-19 pandemic that erupted during this survey's design and distribution periods, the scope of the study, questions, and potential responses had to be altered. The interview component of my research was abandoned, the survey became a solely online project, and I had to add questions that would ascertain whether or not the respondents had actually interacted with campus green spaces and had been on campus at least once. I designed and asked questions to identify and separate COVID-19 as one of the limiting factors to student green space use and access.

Survey Distribution and Data Collection

To ensure as little bias as possible and an equal opportunity for minority students to be given access to the survey, I underwent a large online distribution campaign. I contacted 31 undergraduate professors, two advisors within the College of Natural Resources staff, one Piazza server for a large general course, 4 dance team chats and pages on Facebook, 5 graduate student instructors, and 173 different student organizations.

Only 5 professors responded to my email inquiry to distribute the survey, 4 of which actually allowed me to distribute the survey to their classes (I have no knowledge on whether or not some professors did not respond yet decided to distribute my survey). Both advisors responded, adding the link to my survey to the Newsletters for the majors they advised on, as well as the general CNR Newsletter. Several students responded from the Piazza page I contacted said they would take the survey. None of the graduate student instructors responded to my emails. Of the 173 student organizations I contacted (many of them cultural organizations for minority communities), 6 responded to my inquiry and distributed my survey.

Survey Data Analysis

Once I gathered all of my data, I selected for responses given between the months of February and April with a ReCaptcha score of 0.7, a completion rate of at least 97% (screening the responses for both bot and responses that provided no data). I then converted this file into an

Excel file and a .csv file for analytical analysis within RStudio. The majority of my analysis however was done within the Qualtrics program itself, using their built in Default Response analysis and Data & Analysis functions. With these program features, I visualized the data responses and then conducted p-value, chi-square, and regression analysis for certain variables whilst also collecting the effect size. In RStudio, I coded the NDVI distribution of values and averages for each respondent's childhood zip code region and college dwelling zip code area, though I was unable to conduct any analysis with this data due to my computer's limited ability to process hundreds of Raster files (see the Discussion Section on NDVI for the link to the GitHub Repository I prepared. It contains all of my data and code, as well as a detailed methods document explaining what I planned on doing with the data that is not included in this paper).

RESULTS

Survey Respondent Demographics

My survey received a total of 635 responses from UC Berkeley undergraduate students between the months of February and April. Of these responses, I chose responses with a ReCAPTCHA Score of 0.7 or higher to eliminate any bot responses, removed any repeated answers, and discounted any responses with a completion rate below 97% which left me with a final sample size of 494 respondents. From these responses, I used the Reports and Data Analysis functions within the Qualtrics Survey Program to analyze and breakdown my data. Graphs and visualizations for the responses and analytics can be found in the Appendix.

College of Letters and Sciences	63.96%
College of Natural Resources (Rausser College)	30.42%
College of Chemistry	1.67%
College of Environmental Design	2.29%
Haas School of Business	3.75%
College of Engineering	4.79%

Figure 1. Percentage breakdown of respondents' college(s).

Freshmen	40%
Sophomores	32.38%
Juniors	15.21%
Seniors	10.42%

Figure 2. Percentage breakdown of respondents' school year.

	Identify a single racial category	Identify as many racial categories as applicable
Asian	58.79%	64.44%
White	37.87%	40.30%
American Indian or Alaskan Native	1.67%	2.37%
Black or African American	1.26%	1.29%
Native Hawaiian	0.42%	0.43%

Figure 3. Racial classifications and identified of respondents. One section is when respondents were directed to identify with only a single classification, the other allowed respondents to select as many racial classifications as they identified with.

US Citizens	81.17%
International Students	18.83%

Figure 4. Percentage of International and US Citizen respondents.

In-State	74.06%
Out-of-State	12.13%
International Students	13.81%

Figure 5. Percentages of tuition classifications of respondents.

Female	58.54%
Male	39.79%
Non-binary or Non-conforming	1.25%

Figure 6. Gender distribution of respondents.

Green Space and Environment Word Clouds

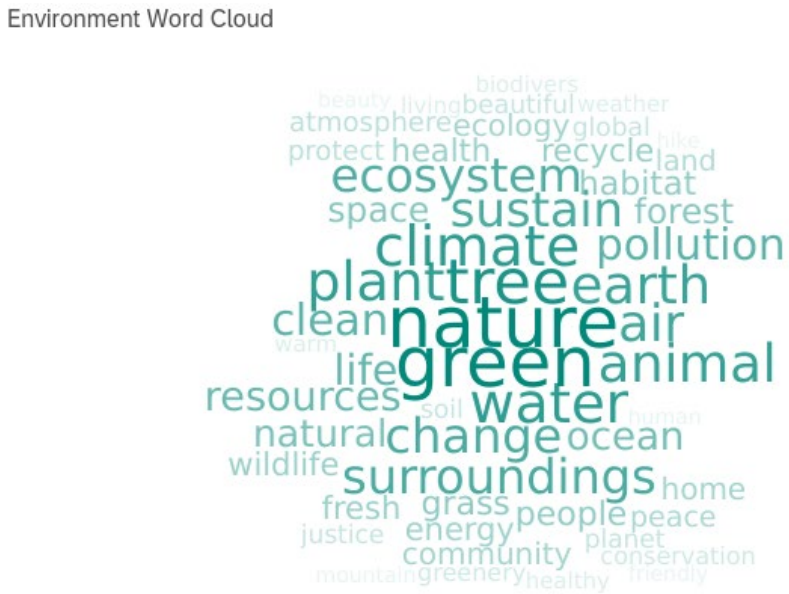

Figure 7. Word Cloud comprised of the words respondents associated with the term 'Environment'.

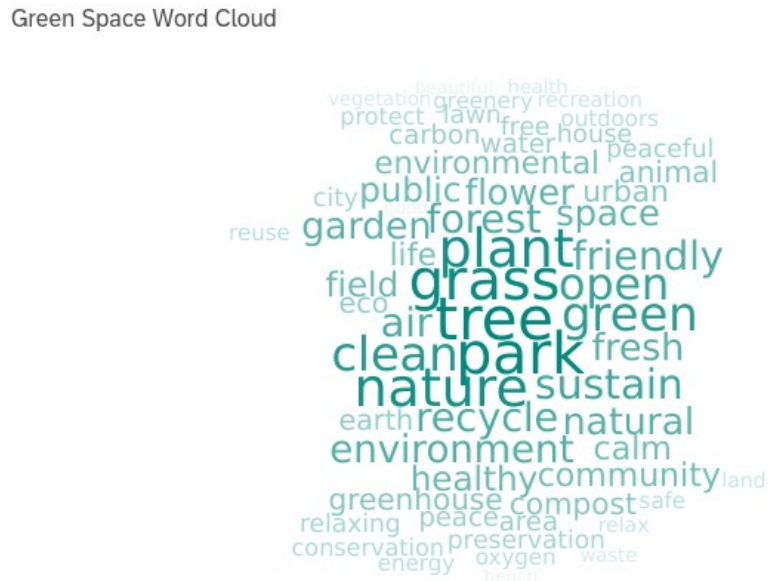

Figure 8. Word Cloud comprised of the words respondents associated with the term 'Green Space'.

Figure 9. Percentage Breakdown of Responses to the question "Do you know what a Green Space is?"

In response to the question "Do you know what a green space is?", 22% of respondents said they had never heard of this term before, 65% said they had some idea of what this term might refer to and mean, and 12% said they had herd this term before and were familiar with its definition and meaning. After providing a basic definition of the term to respondents, they identified areas on campus that they associated with this term and frequented: Memorial Glade, 4.0 Hill, Strawberry Creek, the Eucalyptus Grove, and the Campanile grass area.

Green Space Access and Trends

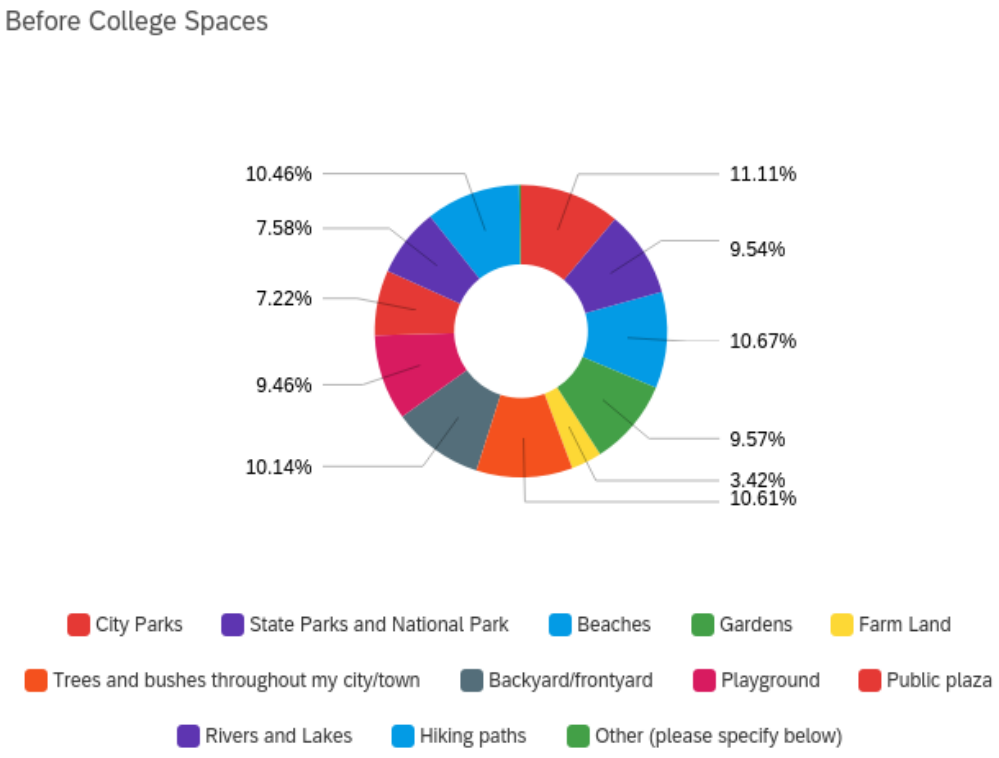

Figure 10. Visualization of the percentage breakdown of the different types of green spaces respondents had access to before college.

When respondents were asked if they had access to a large variety of green spaces in their childhood (between the ages of 0-12), 44.07% said they strongly agree, 32.43% said they agree, 16.22% said they agree, 5.41% said they somewhat disagree, 1.66% said they disagree, and 0.21% said they strongly disagree. When respondents were asked if they had access to a large variety of green spaces in their adolescence (ages 13-17), 41.16% said they strongly agree, 35.55% said they agree, 15.80% said they somewhat agree, 5.20% said they somewhat disagree, 2.08% said they disagree, and 0.21% said they strongly disagree.

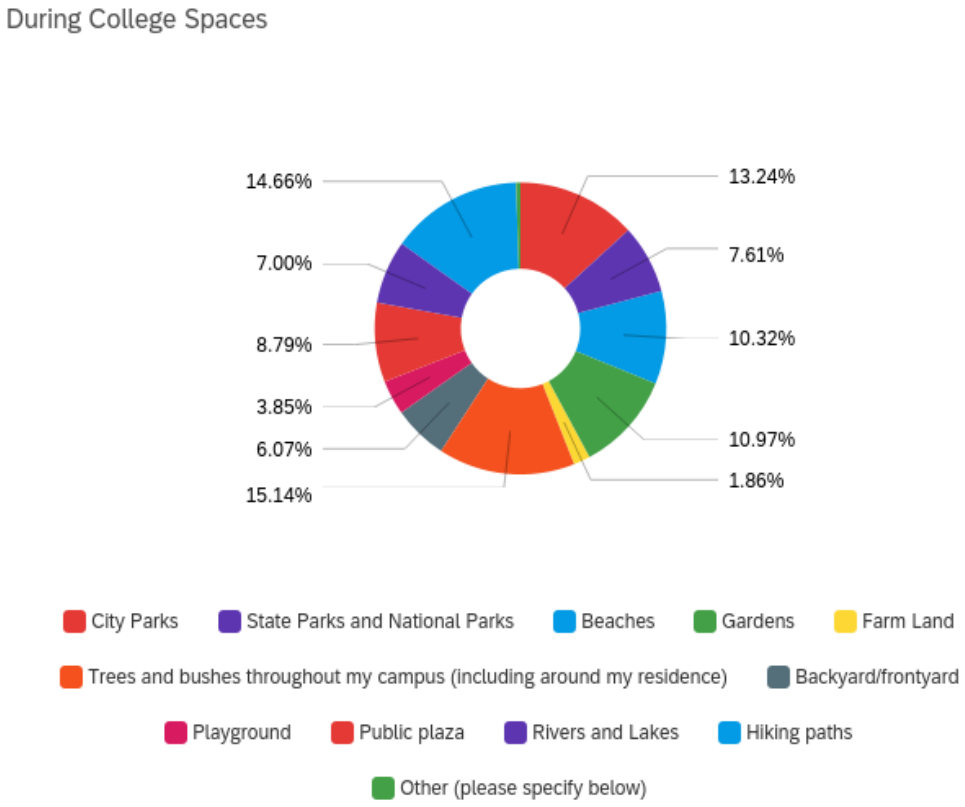

Figure 11. Visualization of the percentage breakdown of the different types of green spaces respondents had access to during college.

When respondents were asked if they had access to a large variety of green spaces in their adulthood (ages 18+), 38.88% said they agree, 29.11% said they strongly agree, 24.32% said they somewhat agree, 4.78% said they somewhat disagree, 1.87% said they disagree, and 1.04% said they strongly disagree. 53.13% of respondents said they use and had more access to green spaces within the university campus, 16.04% of respondents said they use and had more access to the

green spaces around the university campus and grounds, and 30.83% of respondents said they use and had equal access to space within and around the university campus.

When respondents were asked if they believed UC Berkeley has green spaces on and around campus, 68.19% of respondents said yes, 2.08% said no, and 4.99% said that there were a few green spaces, but that they were not accessible. This question also contained options that accounted for the impacts of the COVI-19 pandemic. 15.59% of respondents said they had not been able to go on campus, see, and interact with the green spaces in any capacity due to the lockdowns. 9.15% said that yes, there are green spaces on campus, but that they could not interact with the space in the ways they wanted to. Of this 9.15%, 52.27% identified COVID-19 as the limiting factor, 36.36% said that even before the pandemic they could not interact with the space in the ways they wanted to, and 11.36% said the barrier was not the lockdowns. See Appendix.

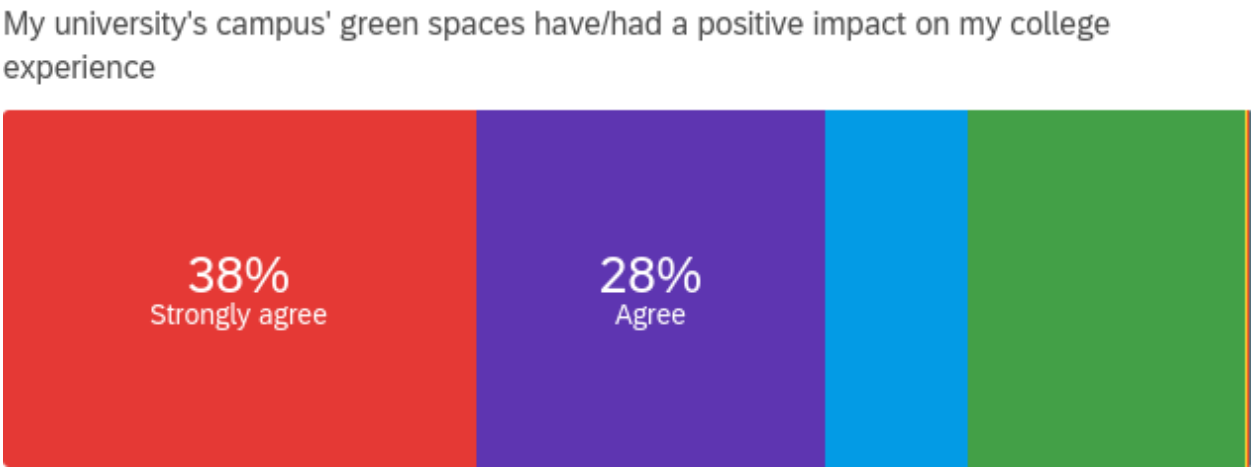

Figure 12. Visualization of the response percentages about the impact college green campus spaces have on student experience.

When students were asked if they believed the campus green spaces had a positive impact on their college experience, 37.84% of respondents said they strongly agree, 27.86% of respondents said they agree, 22.25% of respondents said they had not been able to interact with campus green spaces due to the COVID-19 pandemic, 11.43% said they somewhat agree, 0.21% said they somewhat disagree, 0.21% said they disagree, and 0.21% said they strongly disagree.

When students were asked if campus green spaces had a positive impact on their physical health, 47.61% said they strongly agree, 35.76% said they agree, 14.35% said they somewhat agree, 1.66% said they somewhat disagree, 0.42% said they disagree, and 0.21% said they strongly

disagree. 62.58% of students said they walked more than they used to since starting college. 53.22% said they became more physically active and fit. 51.35% said they became healthier due to their access to campus green spaces. 37.84% said they go outdoors more than they used to. 11.64% said their physical health had not changed in any way. (See Appendix for a visual breakdown of these responses)

When students were asked to respond to the statement 'Campus green spaces have had a positive impact on my mental health', 59.04% of respondents said they strongly agree, 28.48% said they agree, 11.85% said they somewhat agree, 0.21% said they somewhat agree, 0.42% said they disagree, and 0% said they strongly disagree. 80.87% of students said they feel that their mental health improves when they are outside. 80.04% said that going outside lowers their stress levels, 75.88% said they felt like they could breathe when they were outdoors. 68.04% said they felt happier or happier after going outside. 45.74% said going outside on campus green spaces charges them. 31.19% said going to campus green spaces helped them focus. 1.04% said that going outdoors and onto campus spaces stresses them out. 0.21% said they felt their mental health gets worse when going outside and being in the outdoors. 0.21% said they felt sadder after interacting with a campus green space (See Appendix).

When prompted to respond to the statement 'I think that campus green spaces are accessed and used equally among Caucasian students and students of color, 16.04% said they strongly agree, 42.50% said they agree, 27.50% said they somewhat agree, 8.96% said they somewhat disagree, 3.33% said they disagree, and 1.67% said they strongly disagree. When prompted to respond to the statement 'I think campus green spaces are easily accessible to students with physical disabilities or mental conditions (visible and non-visible', 8.96% said they strongly agree, 25.83% said they agree, 41.04% said they somewhat agree, 15.83% said they somewhat disagree, 6.25% said they disagree, and 2.08% said they strongly disagree. See Appendix for visualizations (See Appendix).

I then asked students three 'I feel' questions about campus green spaces. In response to the statement 'I feel welcomed on campus green spaces', 30% of respondents said they strongly agree, 51.46% said they agree, 16.46% said they somewhat agree, 1.88% said they somewhat disagree, 0% said they disagree, and 0.21% said they strongly disagree. In response to the statement 'I feel accepted on campus green spaces', 30.21% of respondents said they strongly agree, 52.29% said they agree, 16.04% said they somewhat agree, 0.83% said they somewhat disagree, 0.21% said

they disagree, and 0.42% said they strongly disagree. In response to the statement 'I feel comfortable in campus green spaces', 31.46% of respondents said they strongly agree, 48.13% said they agree, 17.29% said they somewhat agree, 2.50% said they somewhat disagree, 0.63% said they disagree, and 0% said they strongly disagree (See Appendix).

Statistically Significant Results

	p-value	effect size	chi-square	df
childhood (ages 0-12)	0.0000194	0.17	57.2	20
adolescence (ages 13-17)	0.000566	0.157	47.1	20
adulthood (ages 18+)	0.00998	0.138	37.6	20

Figure 13. There is a statistically significant relationship between racial identity and access to green spaces before college for all three age categories.

	p-value	effect size	chi-square	df
childhood (ages 0-12)	0.000881	0.173	73.9	40
adolescence (ages 13-17)	0.000349	0.177	77.5	40
adulthood (ages 18+)	0.0872	0.146	52.6	40

Figure 14. There is a statistically significant relationship between family income and access to green spaces for the childhood and adolescence age groups. There is no statistically significant relationship between family income and access to green spaces during adulthood.

	p-value	effect size	chi-square	df
I feel welcomed	0.000896	1.44	39.6	16
I feel comfortable	0.0000287	0.16	49.4	16
I feel accepted	0.00705	0.142	38.8	20

Figure 15. There is a statistical significance between respondent's racial identity and their Likert-scale responses to these statements.

	p-value	effect size	chi-square	df
I feel welcomed	0.00178	0.177	60.3	32
I feel comfortable	<0.00001	0.516	515	16
I feel accepted	<0.00001	0.722	1,009	20

Figure 16. There is a statistical significance between respondent's family income and their Likert-scale responses to these statements.

Disabled Student Responses

29 students identified themselves as physically and/or mentally disabled, as recognized by the university. When asked if they felt they university campus is designed to be accommodating towards individuals with their condition(s), 27.59% said they strongly agree, 24.14% said they agree, 31.03% said they somewhat agree, 3.45% said they somewhat disagree, 6.9% said they disagree, and 6.9% said they strongly disagree. When asked if they felt the campus green spaces were accessible to individuals with their condition(s), 41.38% said they strongly agree, 44.38% said they agree, 0% said they somewhat agree, 3.45% said they somewhat disagree, and 10.43% said they strongly disagree. When asked if they found it difficult to engage with the outdoor campus green spaces, 6.90% said they strongly agree, 13.79% said they agree, 6.90% said they somewhat agree, 17.24% said they somewhat disagree, 44.83% said they disagree, and 10.34% said they strongly disagree. In response to the statement 'The university could be doing more to redesign its outdoor green spaces to be more accommodating and accessible', 13.79% of disabled respondents said they strongly agree, 24.14% said they agree, 17.24% said they somewhat agree, 10.34% said they somewhat disagree, 27.59% said they disagree, and 6.90% said they strongly disagree.

The majority of respondents said they believed the campus was designed to accommodate students with their condition(s), there was a bit more of a divide in responses when students were asked if they think the spaces are accessible to students with their condition(s). The majority of responses said that the school could do more to redesign and upgrade the spaces to be more accessible and accommodating, both in the physical environment but also in the training university staff have. Several of these respondents suggested an increased variation in the type of green spaces, asking for more secluded and low simulation environments for people with anxiety, an increase in the available meditation or quiet rooms in campus buildings, and an increased variety in the types of flora available in these spaces. One respondent said that less police patrols around campus green spaces with increased and improved victim sensitivity training would increase their comfort and likely hood to go out into campus green spaces. This respondent and others identified a need to greater access to emergency services when they are outdoors on campus. Students with wheelchairs identified a lack of ramp access to certain green spaces and buildings on campus and that the majority of the bridges across campus creeks and rivers were not suited to wheelchair travel (See Appendix for response visualizations for this sub-sample population).

DISCUSSION

Discussion Introduction

The results of this survey show that campus green spaces do have a positive physical and mental impact on undergraduate students. Students' responses suggest a correlation between the availability of campus green spaces and an increase in physical activity, time spent outdoors, shifts to a more relaxed state of mind, and a sense of mental calm (See Appendix for graphs). Trends in use, access, and willingness to engage in the space aligned with socio-economic and racial factors, as well as time spent outdoors, and self-reported athletic ability or state. I was unable to determine if childhood exposure to green spaces and NDVI averages had a correlational or causational relationship with any of the survey response outcomes. I was able to determine that education may not necessarily have a causational relationship with green space access, but there are signs that it could have a correlational relationship with use, as those who are more educated on the positive impacts and benefits of green spaces are more likely to engage with these spaces. These responses and trends align with previous literature assessing the accessibility and impacts of green spaces in other sample populations and highlights other avenues of inquiry to further study the relationships between social, cultural, and environmental factors of influence in green space use, access, and benefit.

Word Clouds

The majority of respondents responded that they at least had a rudimentary understanding or familiarity with the term green space (Figure 9). When looking at the word clouds of respondents' word associate to the terms 'Environment' (Figure 7) and 'Green Spaces' (Figure 8), this holds true. The term Environment generated a more globalized and macro-perspective in the responses, with terms like 'nature', 'green', climate', 'planet', and 'ecosystem' dominating the associations. The term 'Green Space' promoted more microscale responses, focusing on the elements of the green spaces rather than what they might represent in the form of writing words

such as 'tree', 'grass', 'park', and 'plant'. Both word clouds highlight a more environmental and wild space situated understanding of these two terms rather than a socialized, urbanized, or energetic situated knowledge and understanding of these terms. While there have been studies that show there is a correlational relationship between education and green space use or perceived benefits, there have been no studies that investigate the specific situated knowledges of these perceptions (Abdul-Wahab & Abdo, 2010; Aminrad et al, 2011; Seitz et al, 2013; Tiyarattanachai & Hollmann, 2016). These responses suggest that UC Berkeley undergraduate students have a more theoretical and globalized understanding of what the environment is but perceive green spaces only in how they appear to them in public spaces without an in-depth understanding the underlying environmental and social meaning these spaces hold, a trend of understanding that was identified in two other works (Aminrad et al, 2011; Seitz et al, 2013).

Statistical Significances

While there were numerously statistically significant relationships found, I did not ascertain if any of these relationships were causal or correlational. A statistically significant relationship between racial identity and access to green spaces at all ages is consistent with the previous literature that concludes that race is a barrier factor to access and benefit (Figure 13) Abdul-Wahab & Abdo. 2010; Cochrane et al, 2009; Gerrish & Watkins, 2017). A statistically significant relationship between income and green space access only held true between the ages of 0-17 (Figure 14) (Abdul-Wahab & Abdo. 2010; Cochrane et al, 2009; Gerrish & Watkins, 2017). The lack of a statistically significant relationship between income and green space access in adulthood for a college sample population suggests that the college environment negates and erases socio-economic determinants and barriers to green space access (excluding race). I could not find any literature or studies that analyzed the college environment, green spaces, or income in this manner to compare my results to. The fact that a statistically significant relationship was found between race and income for all ages groups in response to their level of comfort, acceptance, and welcome in campus green spaces suggests a strong psycho-social and cultural component relating to how and where the respondents grew up influences how they interact with the university's green spaces today (Figures 15 and 16) (Aminrad et al, 2011; Rawson et al, 1994; Richards, 2020).

Disabled Student Population of Samples and Their Responses

Although my sample size of disabled students is too small to be a representative sample of the entire undergraduate disabled population, the results I gathered do call for a more specialized and in-depth form of study and inquiry, and I cannot ignore what information I gathered (See Appendix for response visualizations). Several of my respondents identified a need for increased wheelchair accessibility and accommodation. Research has shown that people with mobility disabilities can gain different health benefits, including physical health, mental health, and social health benefits from nature in a range of different contexts, but there is an incredible gap in the research and information available regarding individuals with mobility disabilities and green spaces (Sluimer, 2018; Zhang et al, 2017). One respondent said that less police patrols around campus green spaces with increased and improved victim sensitivity training would increase their comfort and likely hood to go out into campus green spaces. This respondent and others identified a need to greater access to emergency services when they are outdoors on campus.

While my survey did not include questions regarding the different types of green spaces on campus, the variation in flora available, and the benefits of this exposure, these students identified an increase in plant diversity as an area for improvement. Studies have shown that an increased variety in plant biodiversity in green space and an increased variety in available green space types increases the perceived benefits derived from green space exposure (Barton et al, 2010; Bogerd et al, 2018; Dyson and Renk, 2006; Gardsjord et al, 2013; Hipp et al, 2015; Holt et al, 2019; James, et al. 2015; Seitz, 2013; Sugiyama et al, 2008; Wood et al, 2018).

Limitations of My Study

As with any survey-based research, there are several opportunities for error. My sample population was only University of California Berkeley undergraduate students, and my sample may not be representative of the entire undergraduate student body (the majority of my responses were only from two colleges), let alone the graduate student body, and therefore my conclusions may not be applicable to other schools even if they align with response trends in other studies. In order to avoid coverage and sampling error, I sent my survey out to as many minority focused student organizations and classes, but I had no way of controlling whether or not my target groups would distribute or answer my survey. As shown by my demographic data, there is a large bias

towards Asian and White identifying individuals, with Native American and Alaskan Native, Black or African American, and Native Hawaiian populations being largely underrepresented (Dillman et al, 2014; Ponto, 2015; Singleton & Straits, 2009; Check & Schutt, 2012).

Another limitation of my study is that it was voluntary, and those most likely to response to a survey about green spaces are stakeholders with an invested interest or awareness about greenspaces. However, the voluntary response bias was slightly minimized due to the fact a professor offered my survey to his class for extra credit points, thus incentivizing students who otherwise would have ignored my survey to respond to it. This incentive that he provided also helped minimize the nonresponse error for my study, though the majority of the population I distributed the survey to did not respond in any capacity.

Even when considering my pilot study, the input from my beta testers, graduate student instructors, peers, and mentor, there is still the potential for measurement error in that my question and response framing and analysis are not able to accurately reflect the topic of interest, especially if respondents did not answer truthfully (Dillman et al, 2014; Ponto, 2015; Singleton & Straits, 2009; Check & Schutt, 2012). I was also greatly limited by the COVID-19 pandemic, preventing me from being able to conduct in person observational and interview studies, my technological limitations (as discussed below), and my lack of knowledge in coding to be able to conduct large scale multivariable and cluster analysis with my data.

NDVI Trends and Data

This portion of my study was the most frustrating and challenging portion of my research due to the fact I was not able to complete the analysis of this portion of my data set. Due to the COVID-19 pandemic, I have lost access to the majority of my coding resources, including the computers used for large projects. Due to the large amount of Raster files that needed processing for my analysis, my RStudio would continually crash, quit, and then reboot. Based on my pilot study data, I hypothesize that there is a statistically significant relationship between the average NDVI value of each respondent and their responses to the survey. I have included the link to my GitHub repository for those who are interested and have the technologic capacity to look at my code and run it to view the relationships and values exposed. In this repository, I have included a document outlining the methodology of the specific tests I planned on conducting with this data,

including single variable and multivariable analysis of how respondent's NDVI exposure and access before college can potentially impact and influence how they responded to the survey and how they interact with campus green spaces to determine if there is a statistically significant and causal relationship between these factors.

https://github.com/getlaam/GreenSpace_Thesis.git

Future Directions

Outside of establishing that trends in greenspace use within the UC Berkeley undergraduate population align with other study populations and conclusions, I wanted this survey to serve as a basis to show that there are other factors of influence that impact how individuals interact with greenspace that need to be studied and that the college environment as a study cite is a unique situation that is underrepresented in green space research. We need more multivariable analysis that looks beyond socio-economic and racial determinant of access and use across numerous study populations, focusing on the role of NDVI exposure, as well as needing more studies that determine causal or correlational relationships rather than statistical significance.

There is an incredible gap in knowledge about the role longitudinal exposure to green spaces from childhood through to adolescence can have on how individuals interact to green spaces when given equal access. We know that race remains a determinant factor for green space use and access in the college environment when income does not, but we do not know why, nor do we know what other factors are related to this relationship. There is also a lack of quantitative research analyzing interviews with minority community members (African American, Hispanic, Native American, Alaskan Native, Native Hawaiian, and immigrant communities) about their experience with green spaces throughout their lifetimes and why they choose to avoid or interact with certain spaces in their everyday environment.

A final future direction of study is to look at the longitudinal relationship and role education and education services, such as field trips and science camps, play in students' decisions to engage with campus and city green spaces. There is little to no research that looks if education curriculum, education origin (state, county, country, rural vs. urban), and program type influences individual's

opinions ad choices surrounding green spaces in their built environment (this lack of research applies to all education levels, not only college level).

Conclusions and Broader Implications

My study's main function is to serve as a foundation to inform further and more specialized research on the various environmental, social, and cultural factors that influence how and why certain individuals access green spaces and their benefits. While I was not able to accomplish everything I wanted to with my study, that does not mean the data I gathered is useless; I was able to confirm that trends of use of green spaces and factors of influence like socio-economic status and race observed in other sample populations true for my own. I was able to establish significant relationships beyond race and economic status to student access and use of campus green spaces, indicating that there are additional cultural and psycho-social factors that influence how and why students interact with campus green spaces that are under-researched. I was also able to identify areas where university planners and administration officials could improve their planning and maintenance of campus green spaces. Based on my findings, I would recommend for universities to increase funding towards campus green spaces to increase the biodiversity within these spaces, increase the variety of type of green space available, increase the number of smaller and more secluded campus green spaces, invest in indoor mediation and/or plant rooms, including adding spaces or signs that address the occupation of indigenous lands, upgrade bridges and roads to be more wheelchair accessible, and ensure easy accessibility to all green spaces for emergency services. I would also recommend universities decrease the amount of police patrols in and around campus green spaces in order to increase minority student comfort in these areas whilst simultaneously increasing in staff training surrounding racial bias, the impacts of systemic inequities on the psyche, and victim sensitivity. My research and conclusions confirm previously identified trends within the college environment, identify areas for further exploration, and identify topics and areas of improvement for university administration to use to improve the accessibility and condition of their campus green spaces.

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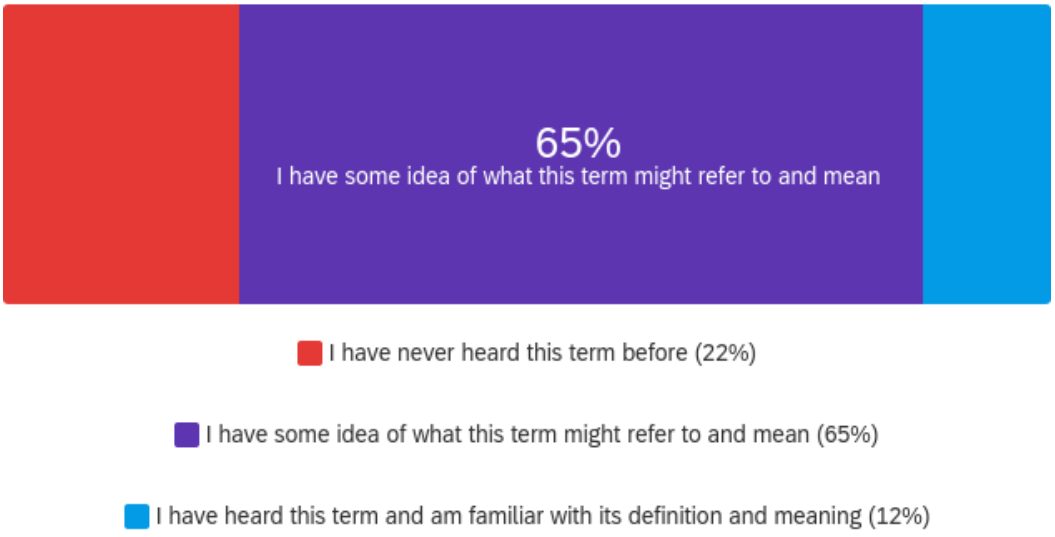
APPENDIX

Question: Please write and list the first five words or phrases you associate with the term 'Environment'

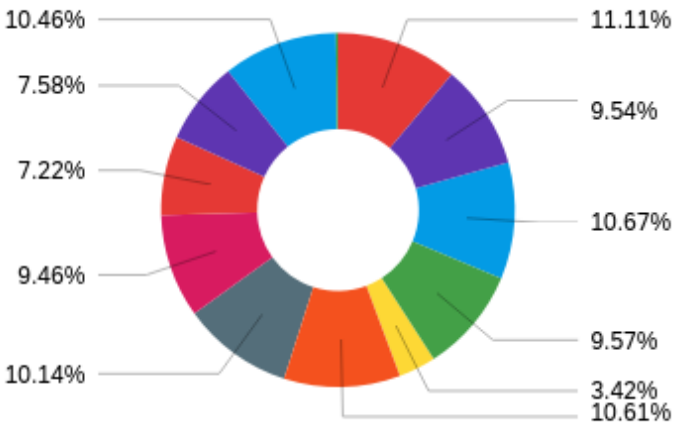
Question: Please write and list the first five words or phrases you associate with the term 'Green Space'

Do you know what a Green Space is?

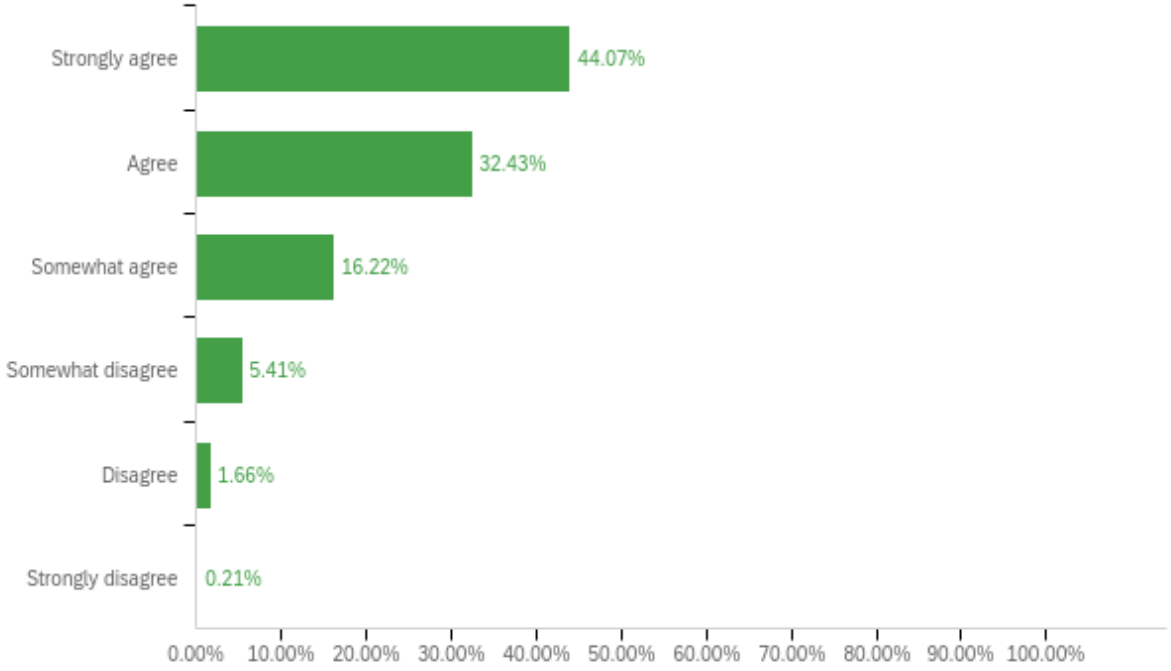


What locations on campus come to mind when you think of a campus green space?

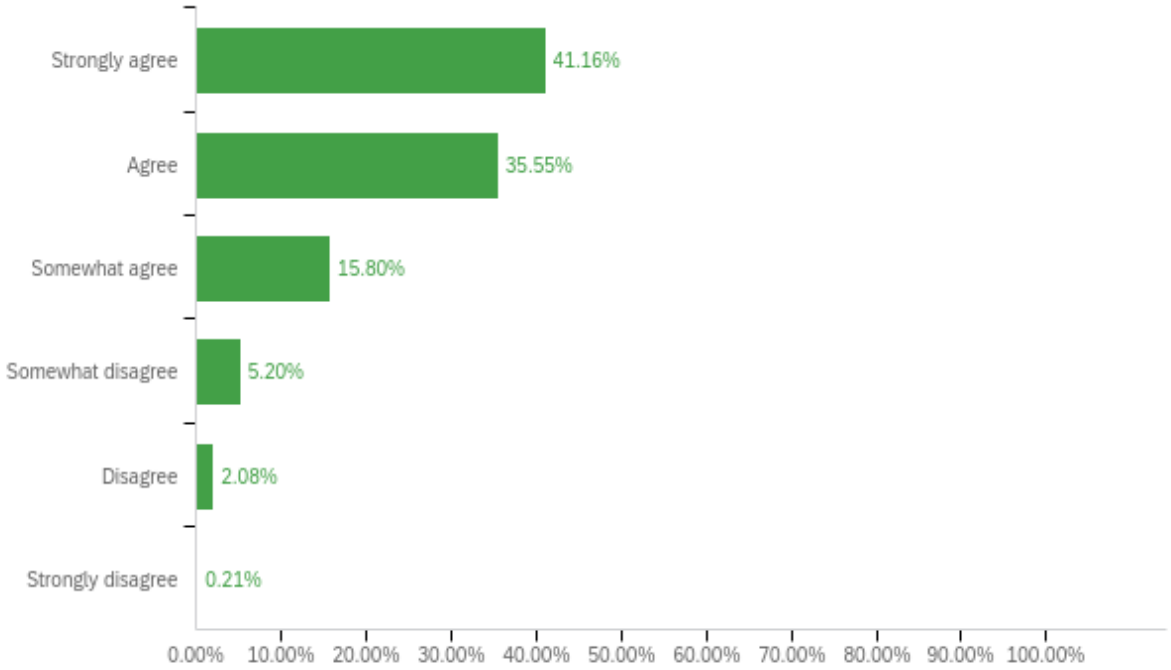
Before College: Green Space Access



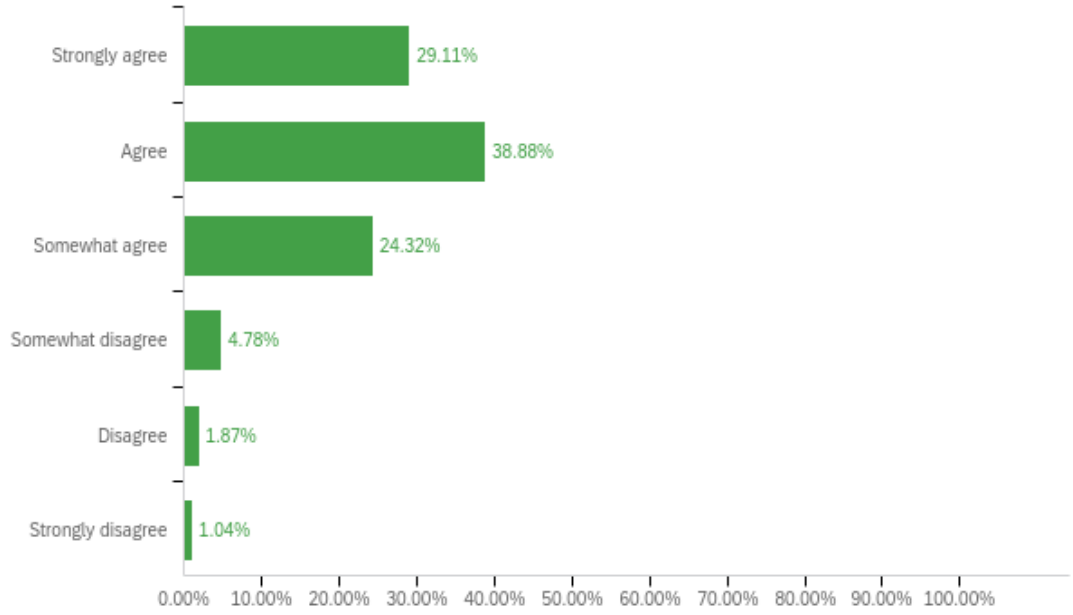
I had access to a large variety of green spaces in my childhood (ages 0-12)



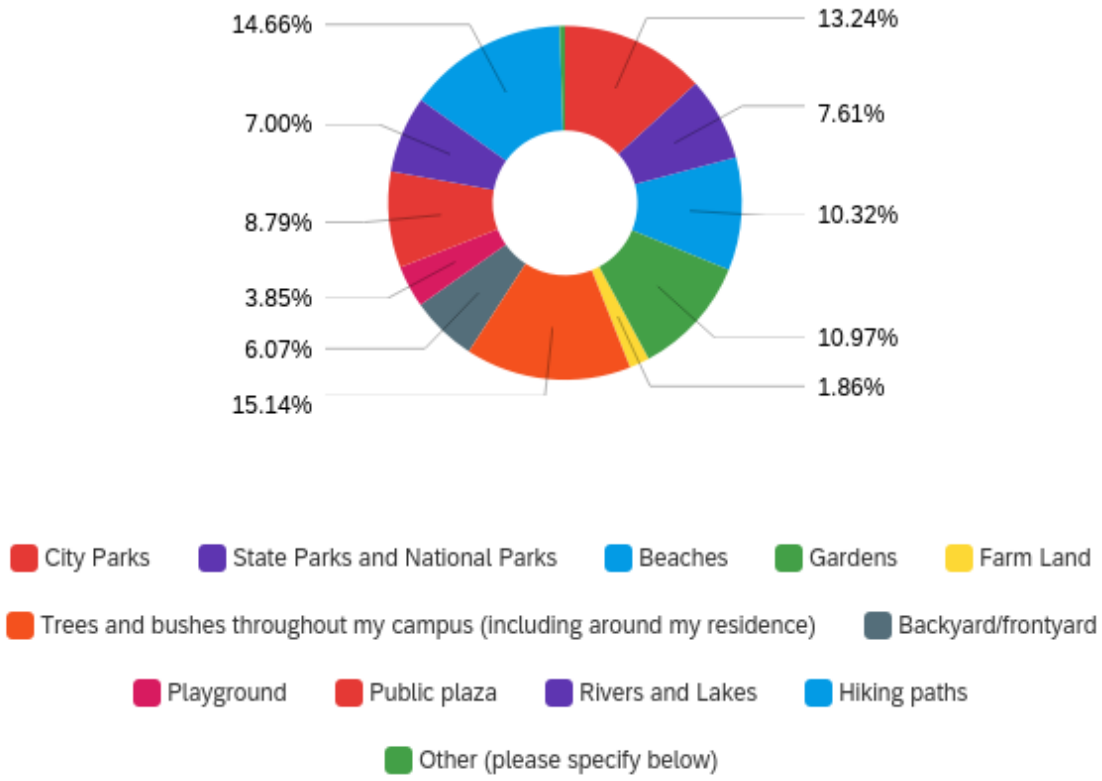
I had access to a large variety of green spaces in my adolescence (ages 13-17)

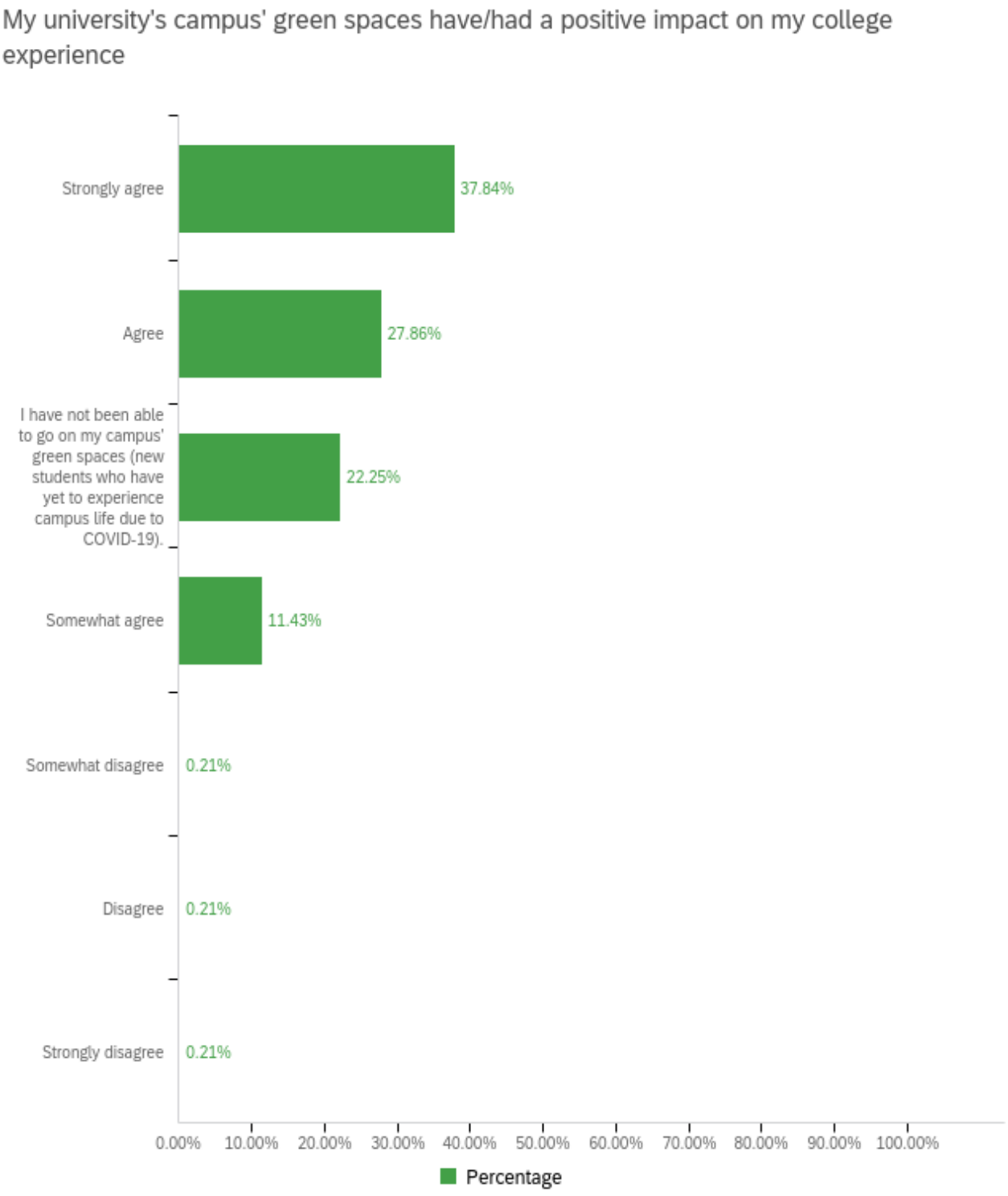


I had or have access to a large variety of green spaces in my adulthood (18+)

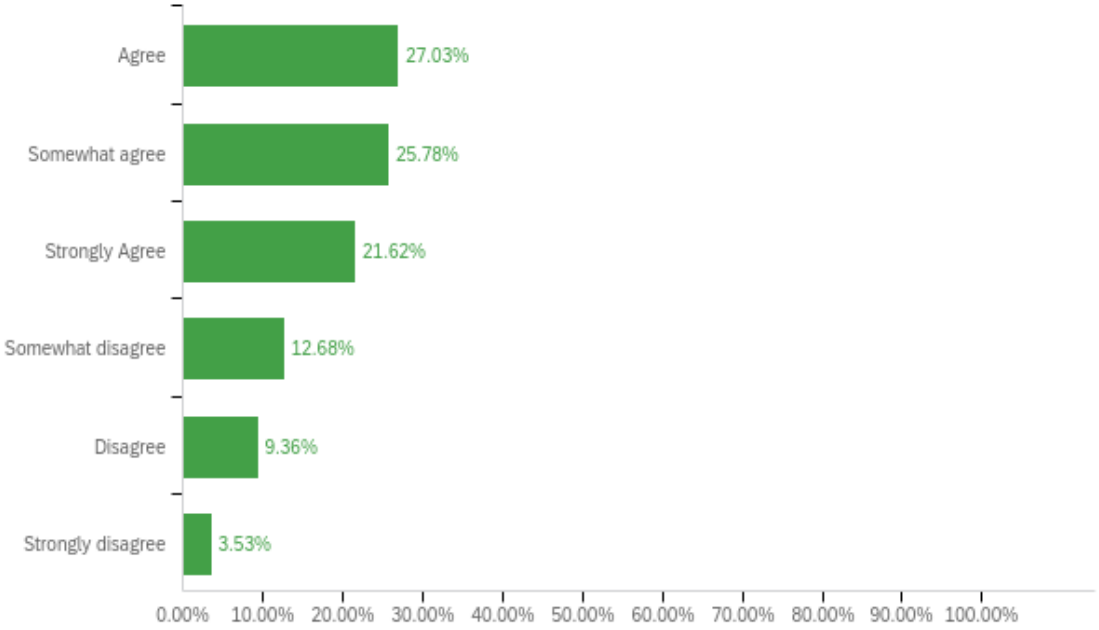


During College: Access to Green Spaces

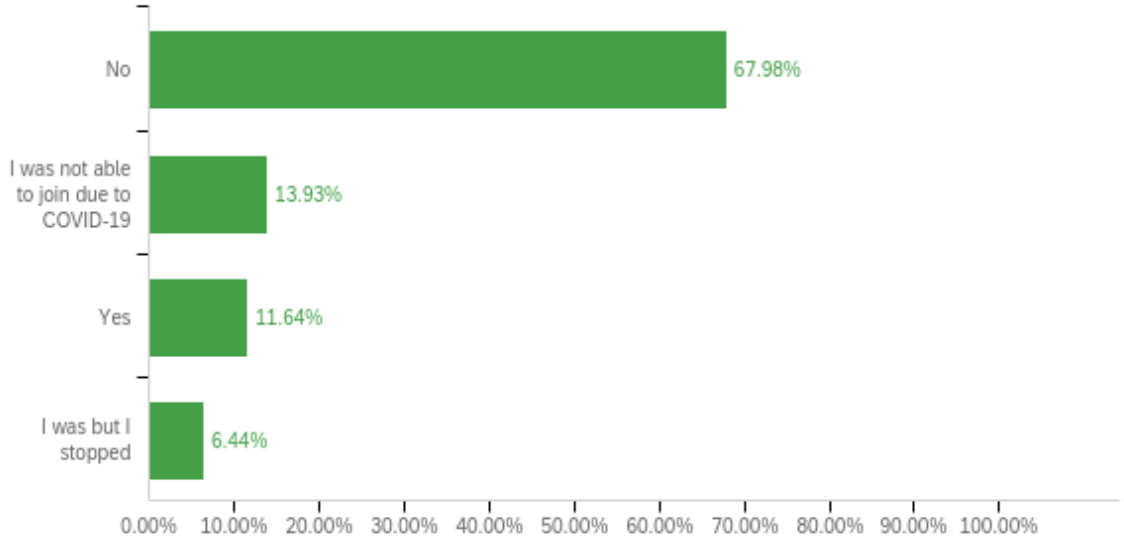


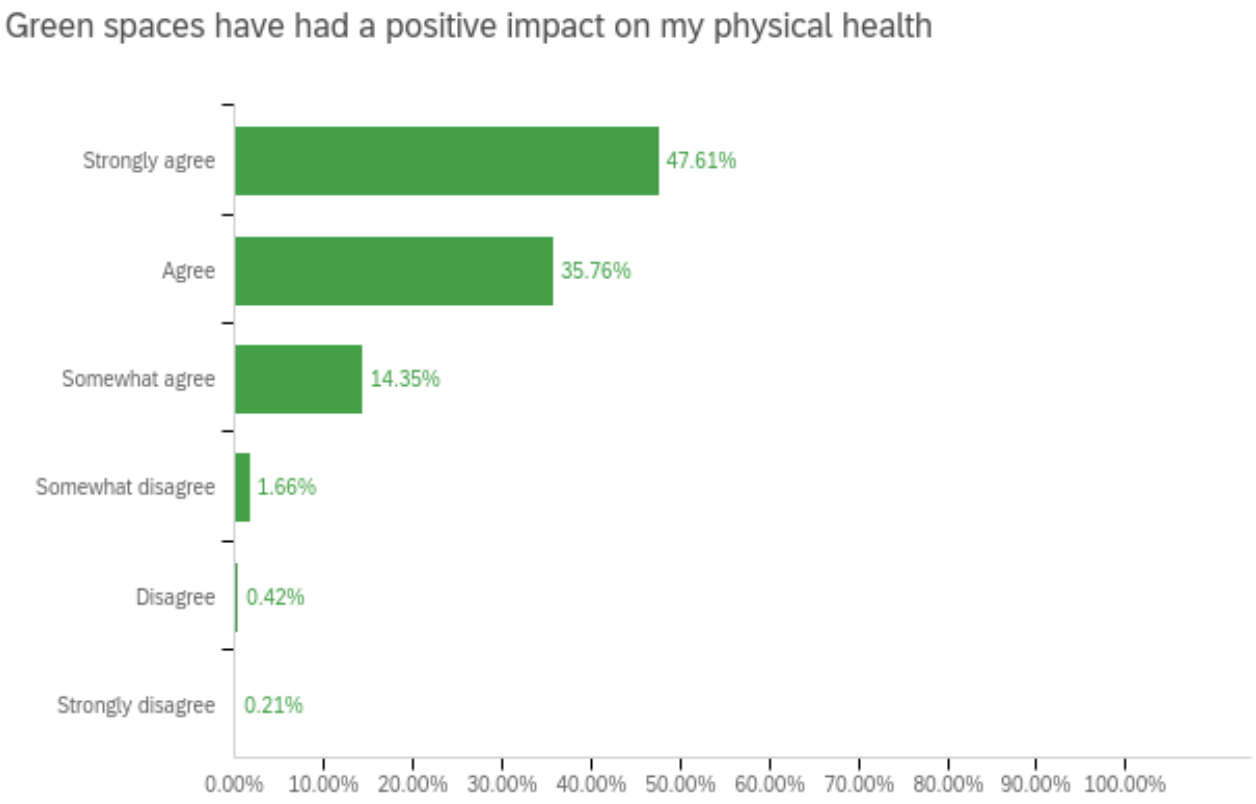

My university's campus' green spaces have/had a positive impact on my college experience
Strongly agree
37.84%
Agree
27.86%
I have not been able to go on my campus' green spaces (new students who have yet to experience campus life due to COVID-19).
22.25%
Somewhat agree
11.43%
Somewhat disagree
0.21%
Disagree
0.21%
Strongly disagree
0.21%
0.00% 10.00% 20.00% 30.00% 40.00% 50.00% 60.00% 70.00% 80.00% 90.00% 100.00%
Percentage

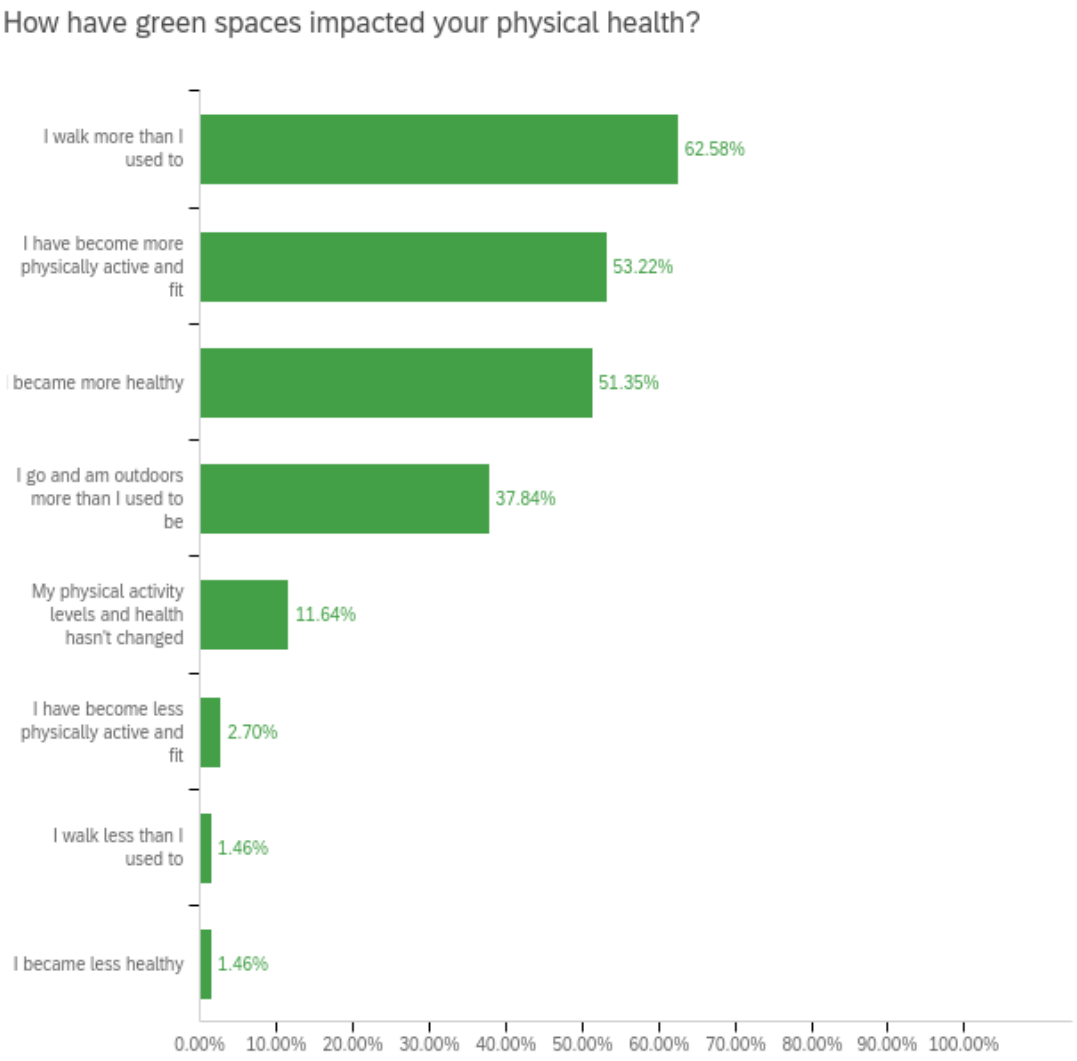
I would describe myself as an athletic person

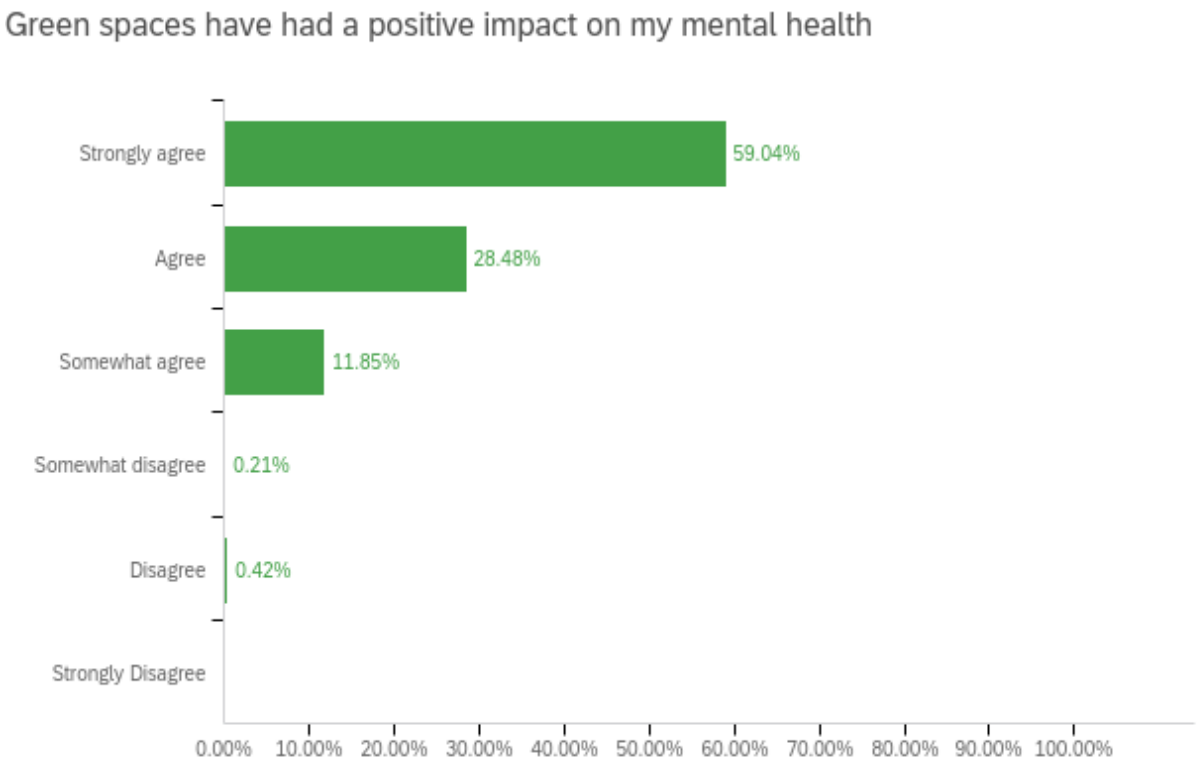


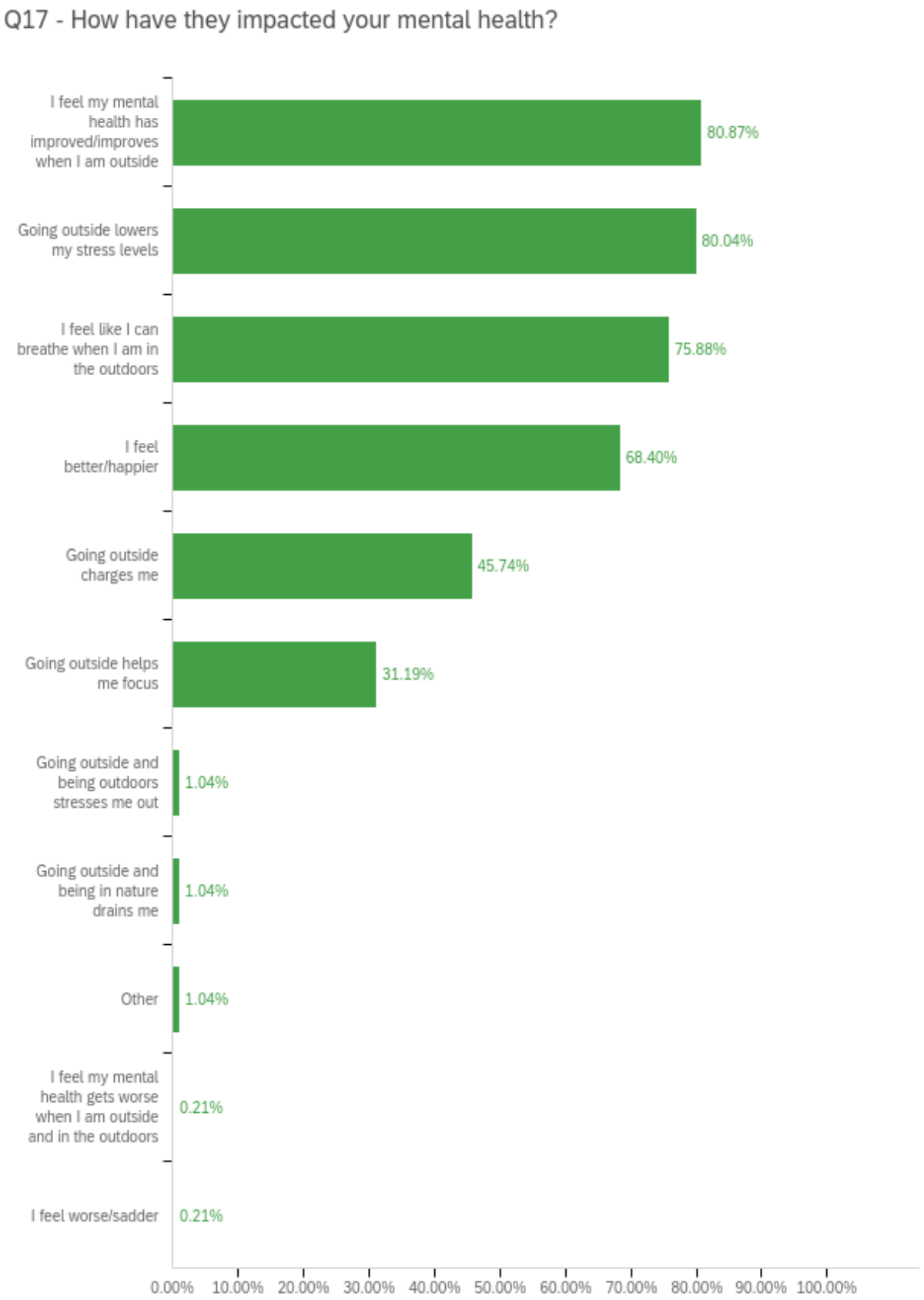
I am part of an athletic team/club on campus



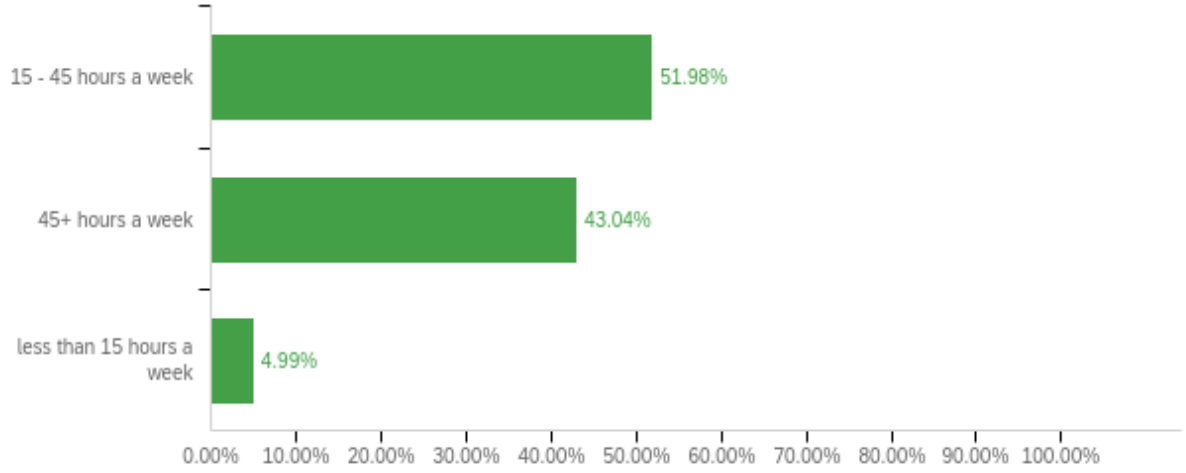

Green spaces have had a positive impact on my physical health
Strongly agree
47.61%
Agree
35.76%
Somewhat agree
14.35%
Somewhat disagree
1.66%
Disagree
0.42%
Strongly disagree
0.21%
0.00% 10.00% 20.00% 30.00% 40.00% 50.00% 60.00% 70.00% 80.00% 90.00% 100.00%


How have green spaces impacted your physical health?
I walk more than I used to
62.58%
I have become more physically active and fit
53.22%
became more healthy
51.35%
I go and am outdoors more than I used to be
37.84%
My physical activity levels and health hasn't changed
11.64%
I have become less physically active and fit
2.70%
I walk less than I used to
1.46%
I became less healthy
1.46%
0.00% 10.00% 20.00% 30.00% 40.00% 50.00% 60.00% 70.00% 80.00% 90.00% 100.00%

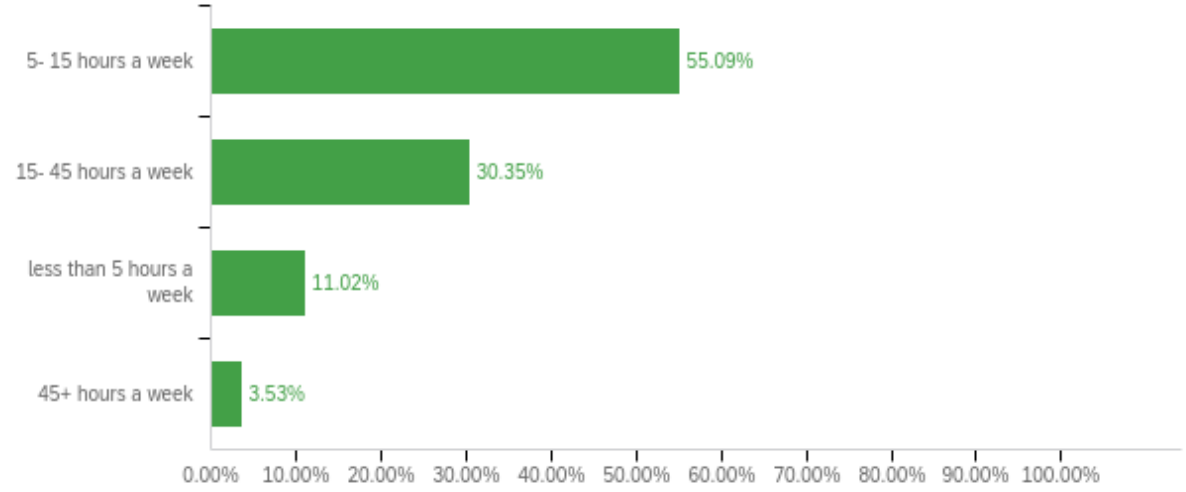

Green spaces have had a positive impact on my mental health
Strongly agree
59.04%
Agree
28.48%
Somewhat agree
11.85%
Somewhat disagree
0.21%
Disagree
0.42%
Strongly Disagree
0.00% 10.00% 20.00% 30.00% 40.00% 50.00% 60.00% 70.00% 80.00% 90.00% 100.00%


Q17 - How have they impacted your mental health?
I feel my mental health has improved/improves when I am outside
80.87%
Going outside lowers my stress levels
80.04%
I feel like I can breathe when I am in the outdoors
75.88%
I feel better/happier
68.40%
Going outside charges me
45.74%
Going outside helps me focus
31.19%
Going outside and being outdoors stresses me out
1.04%
Going outside and being in nature drains me
1.04%
Other
1.04%
I feel my mental health gets worse when I am outside and in the outdoors
0.21%
I feel worse/sadder
0.21%
0.00% 10.00% 20.00% 30.00% 40.00% 50.00% 60.00% 70.00% 80.00% 90.00% 100.00%

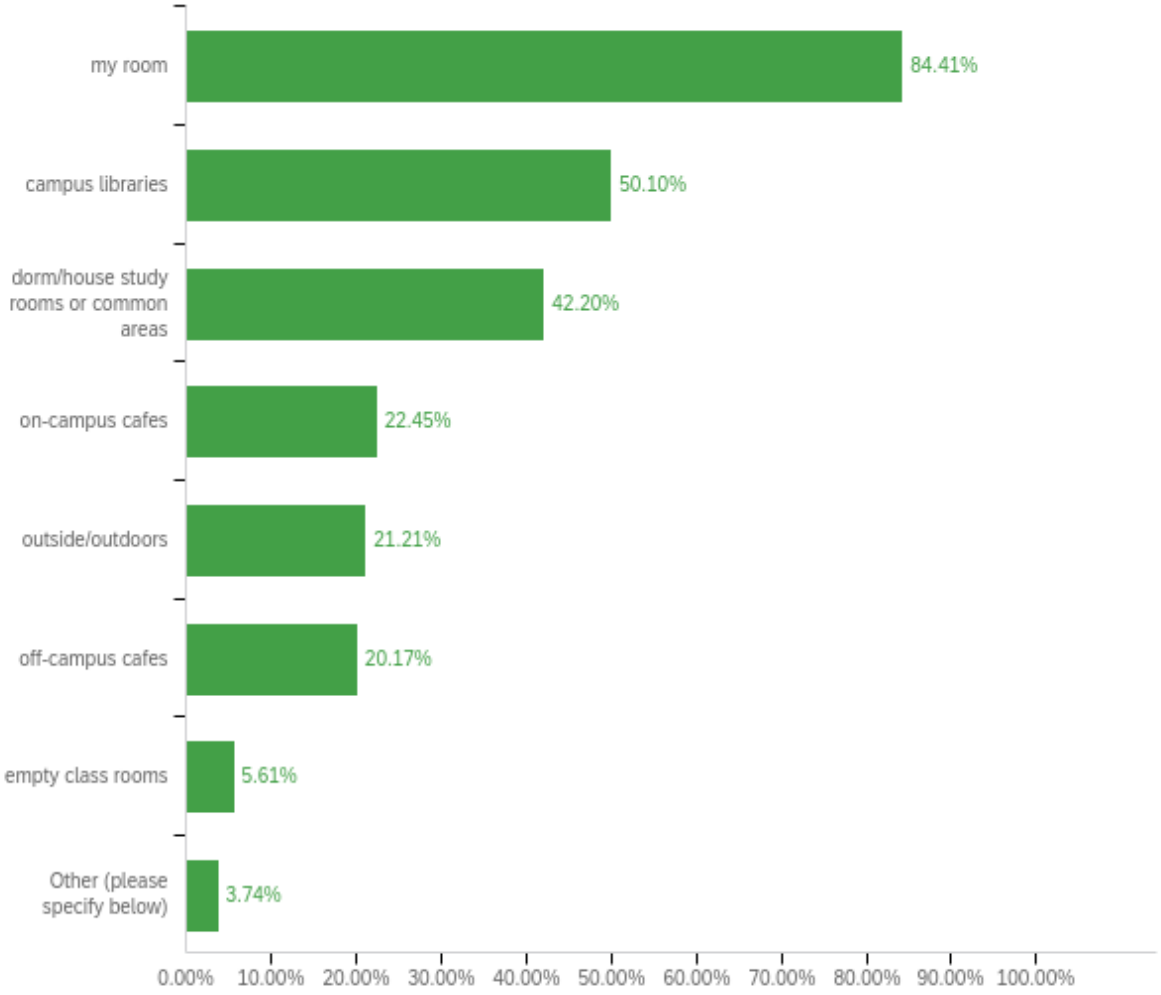
I spend an average of ___ hours indoors a week (not counting when you are asleep, also pre-COVID, lockdown, and quarantine)

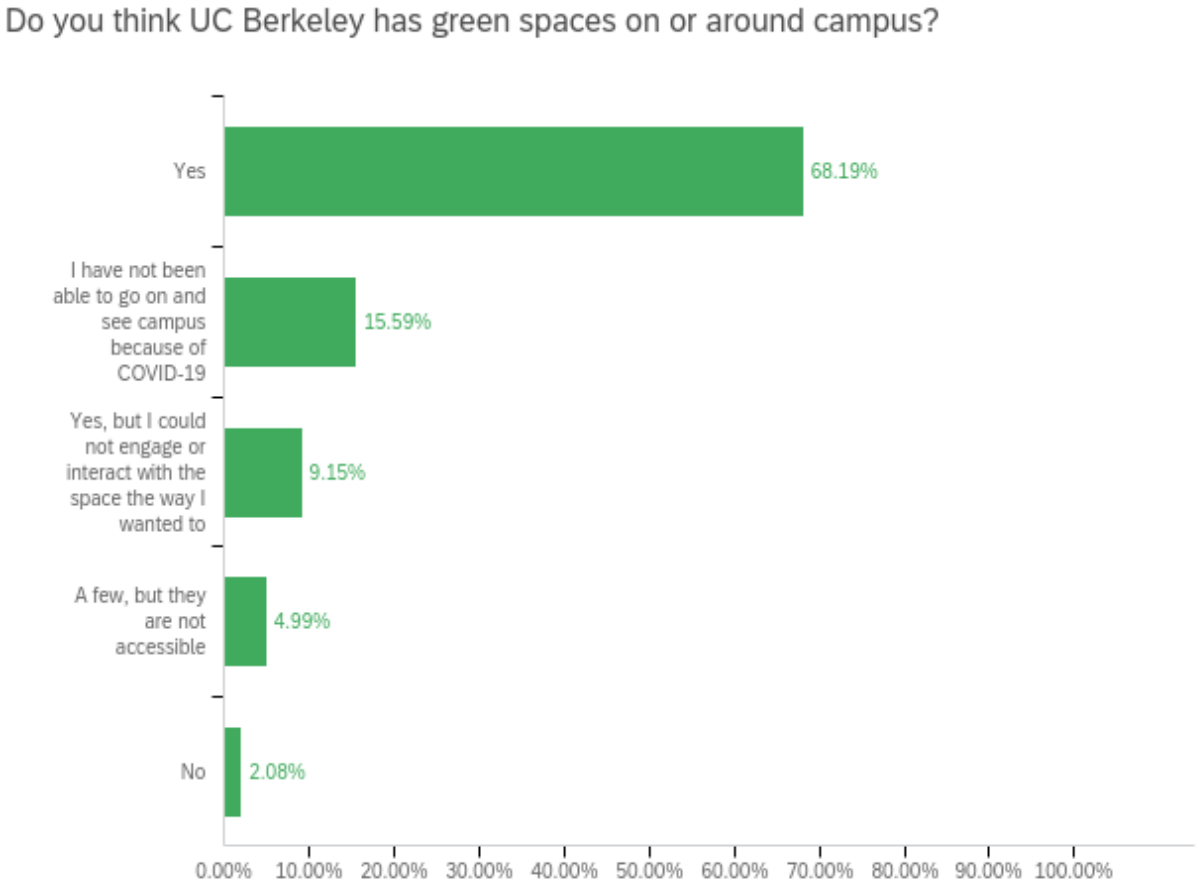


I spend an average of ___ hours outside/outdoors a week (pre-COVID, lockdown, and quarantine)

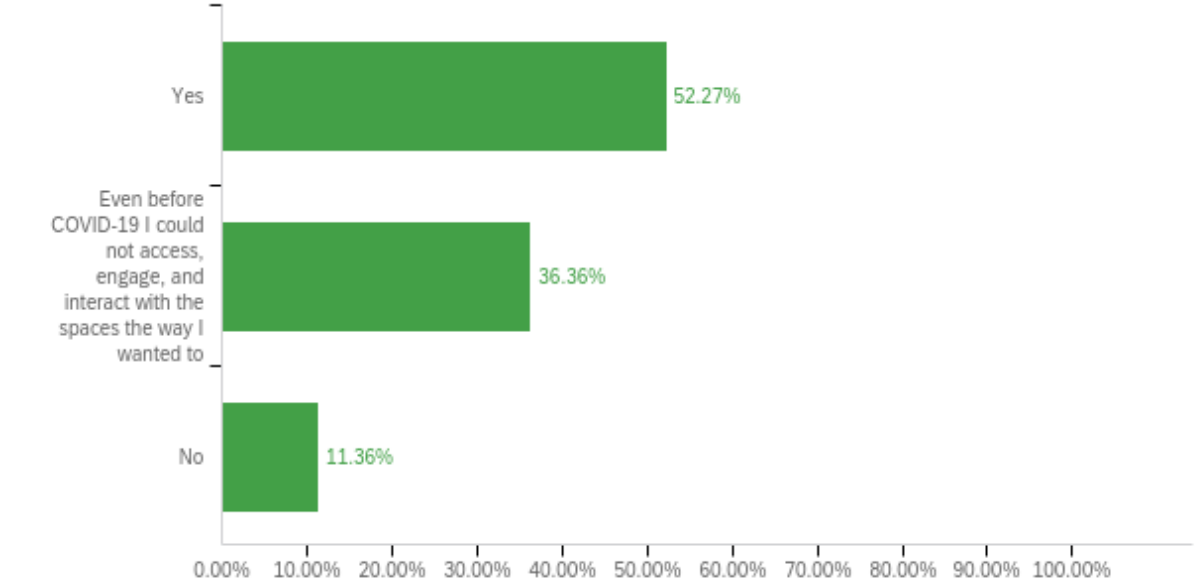


I study and do the majority of my schoolwork in___ This refers to pre-COVID and lockdown times.

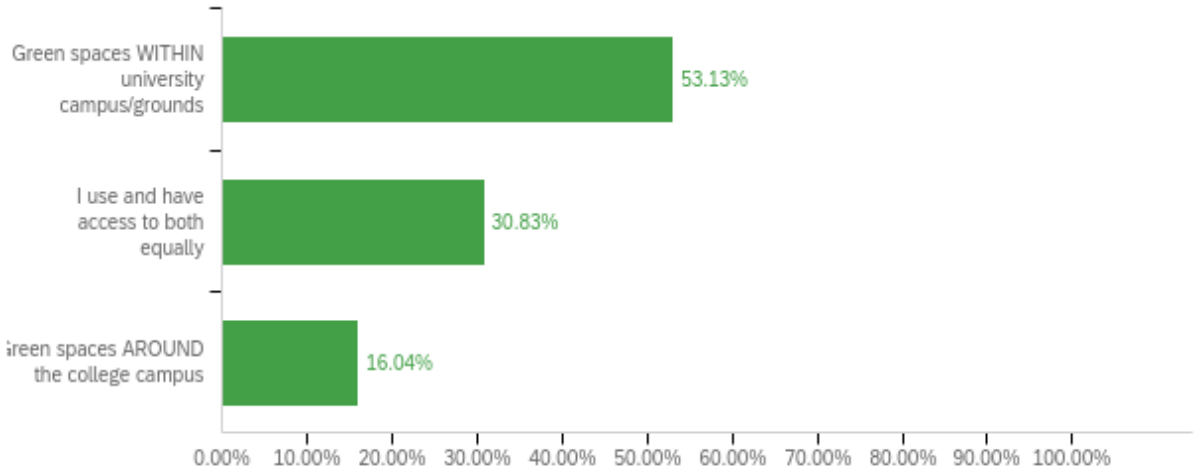



Do you think UC Berkeley has green spaces on or around campus?
Yes
68.19%
I have not been able to go on and see campus because of COVID-19
15.59%
Yes, but I could not engage or interact with the space the way I wanted to
9.15%
A few, but they are not accessible
4.99%
No
2.08%
0.00% 10.00% 20.00% 30.00% 40.00% 50.00% 60.00% 70.00% 80.00% 90.00% 100.00%

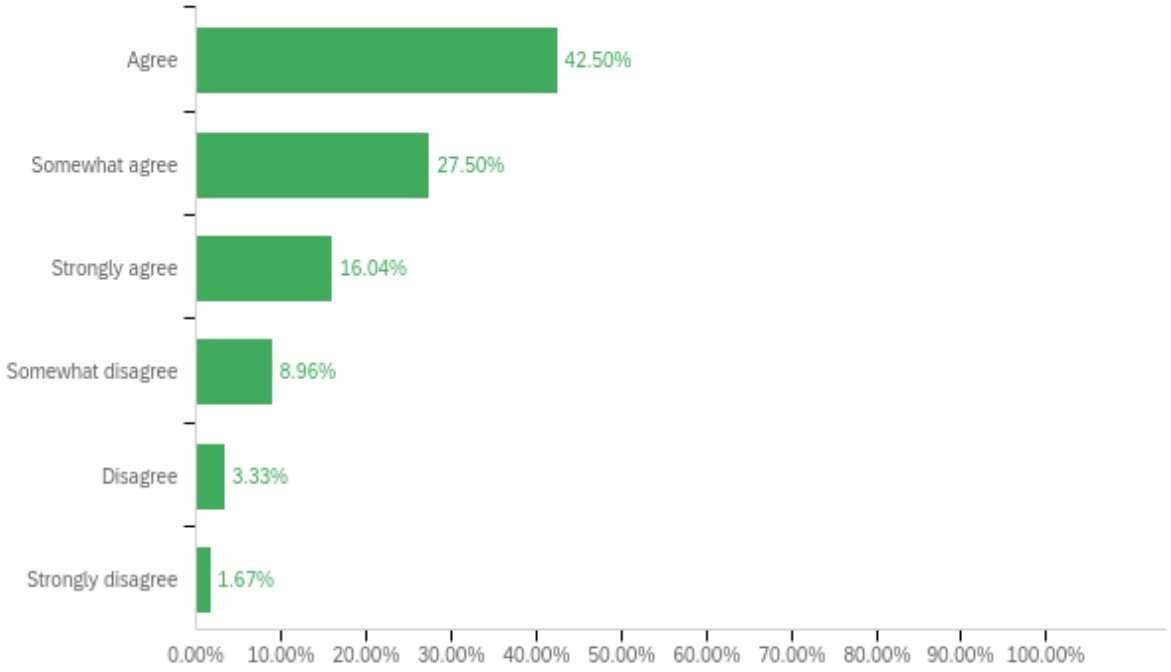
If previous question's answer was No, Is this because of COVID?



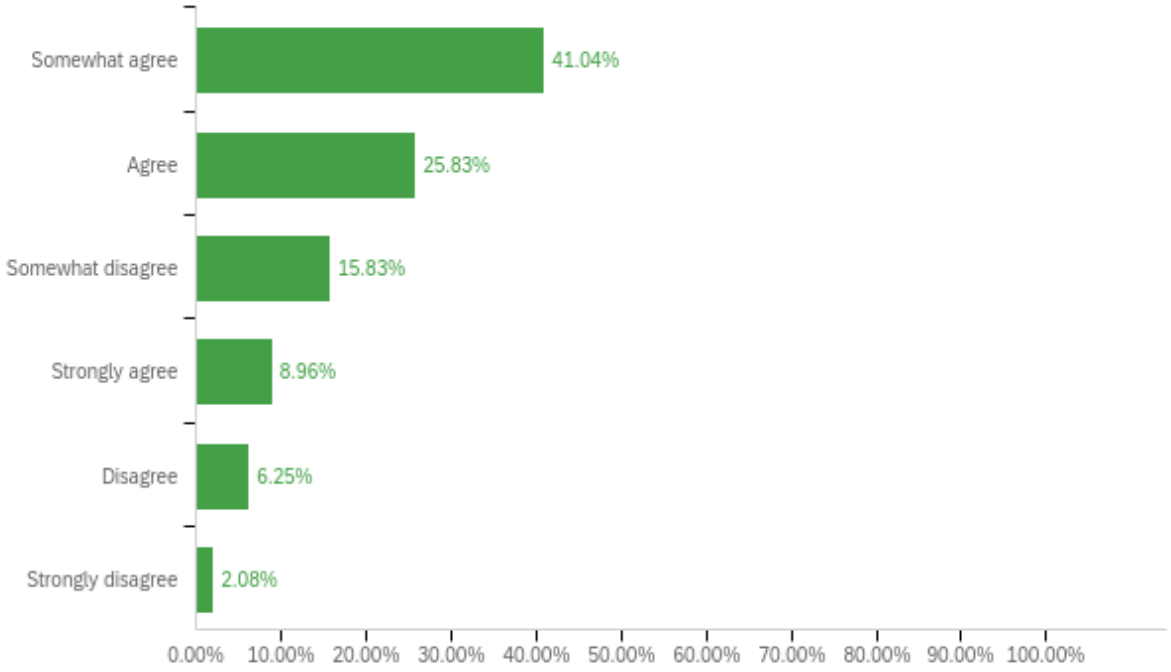
Which do you use more or have greater access to?



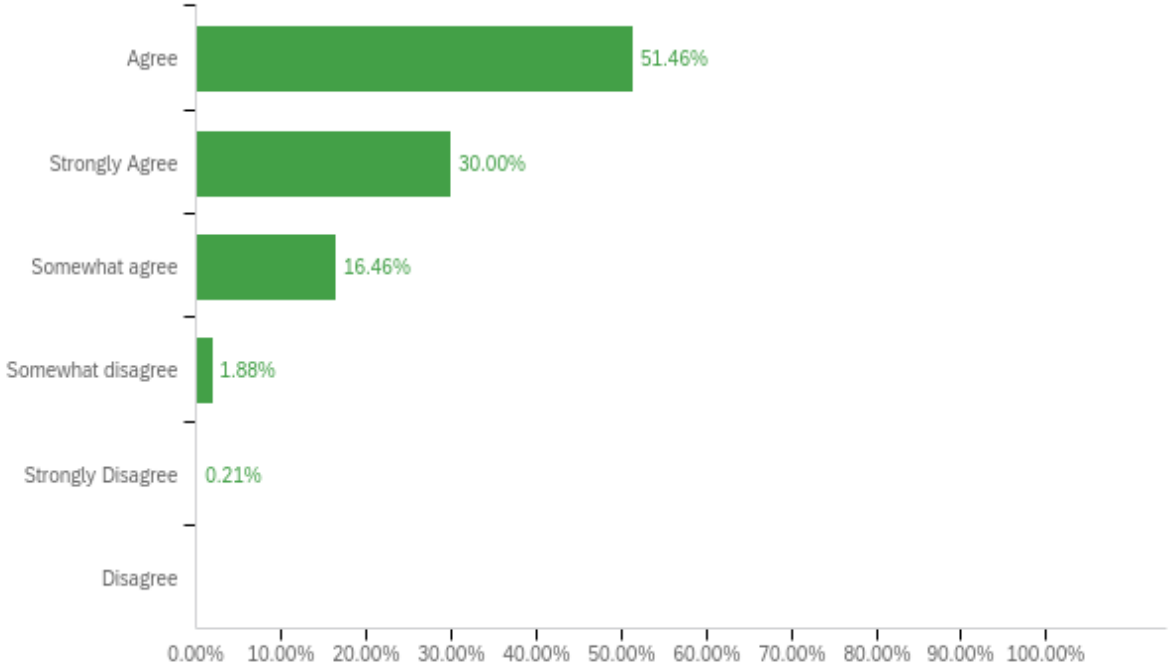
I think that campus green spaces are accessed and used equally among Caucasian students and students of color



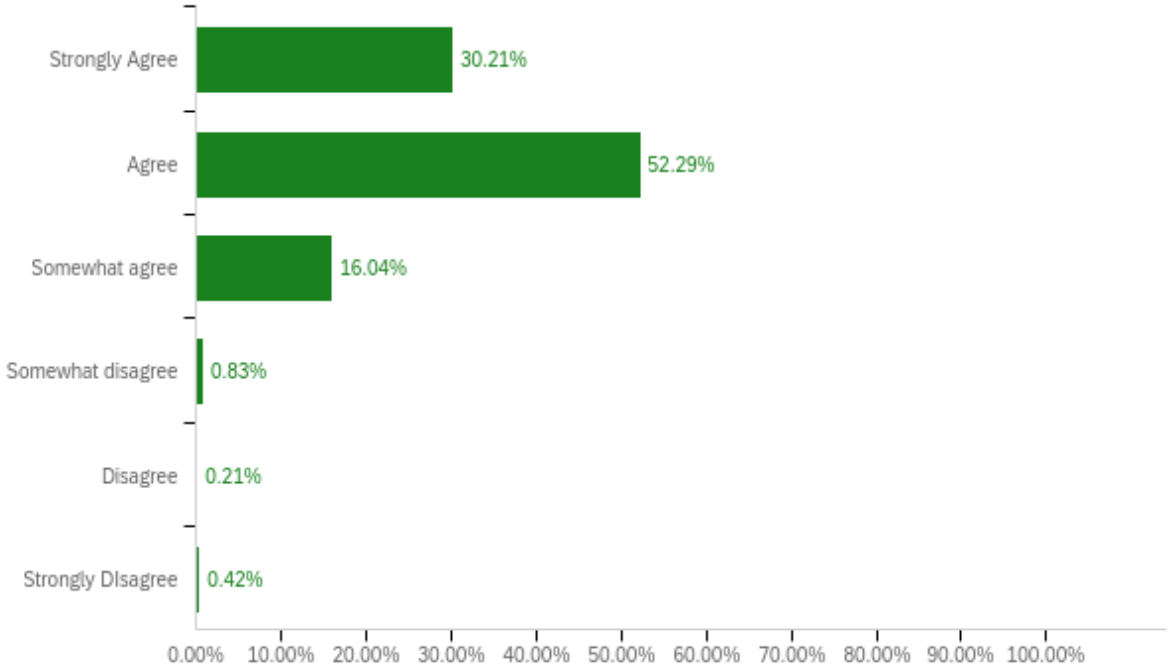
I think that campus green spaces are easily accessible to students with physical disabilities, medical, or mental conditions (visible and non-visible)



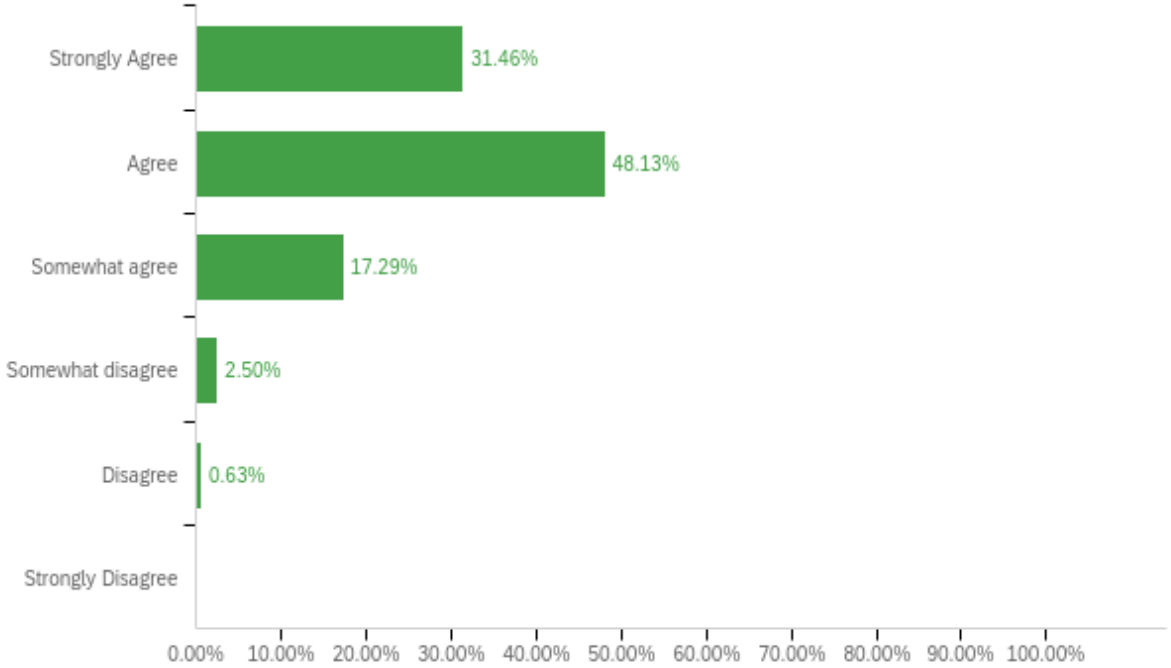
I feel welcomed on campus green spaces.



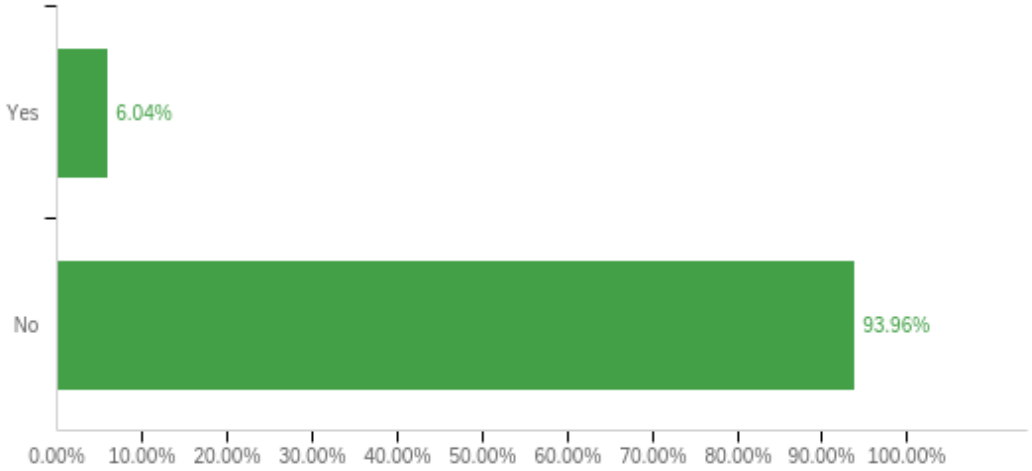
I feel accepted on campus green spaces



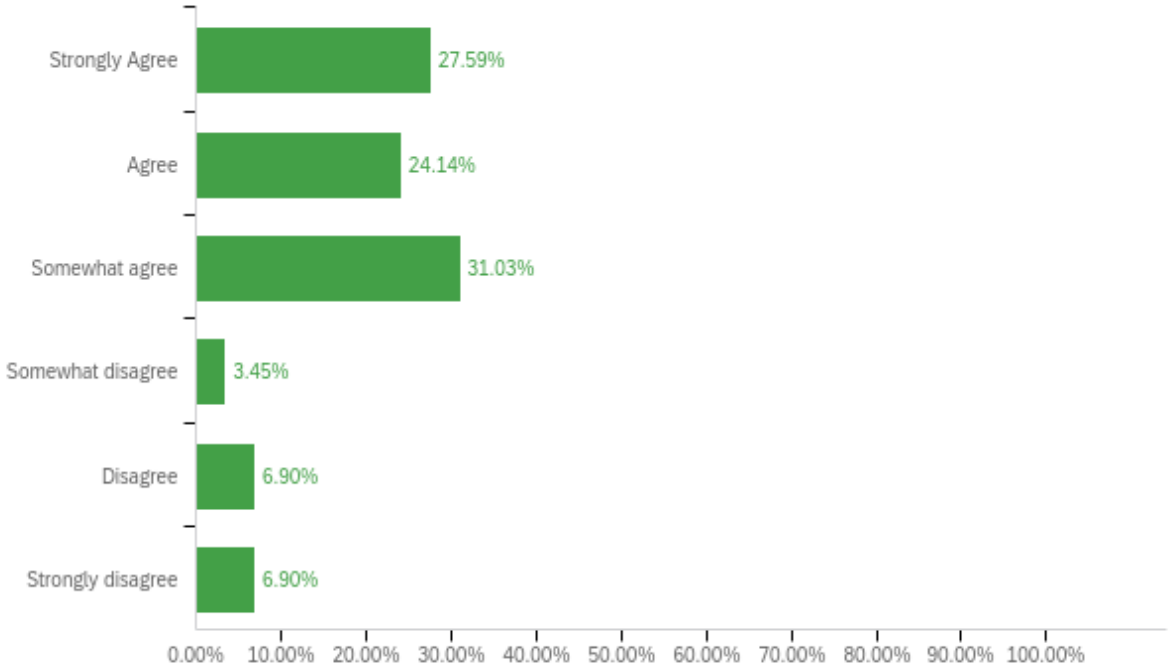
I feel comfortable in campus green spaces



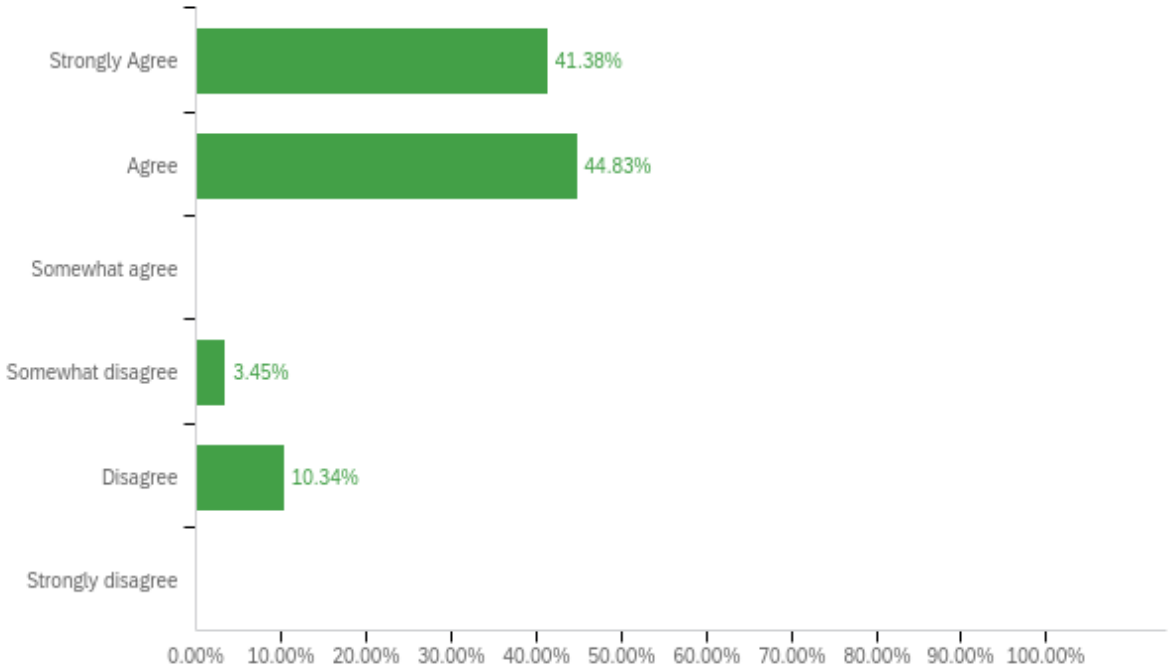
Do you have a physical or mental disability?



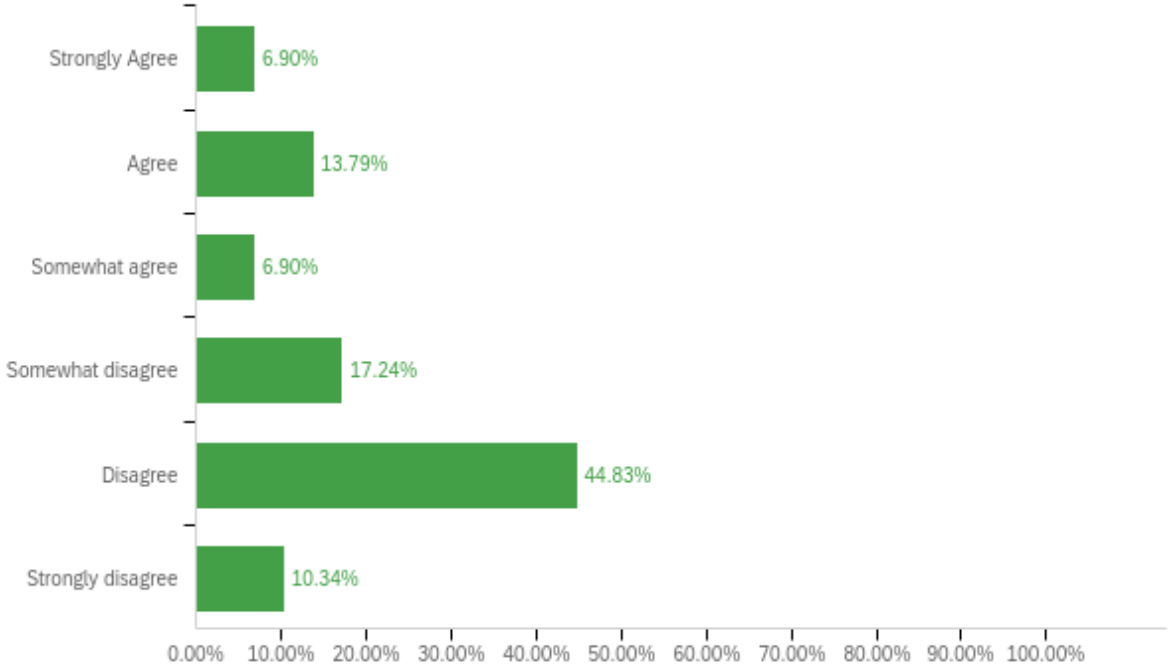
I think the university campus is designed to be accommodating to students with my condition(s).



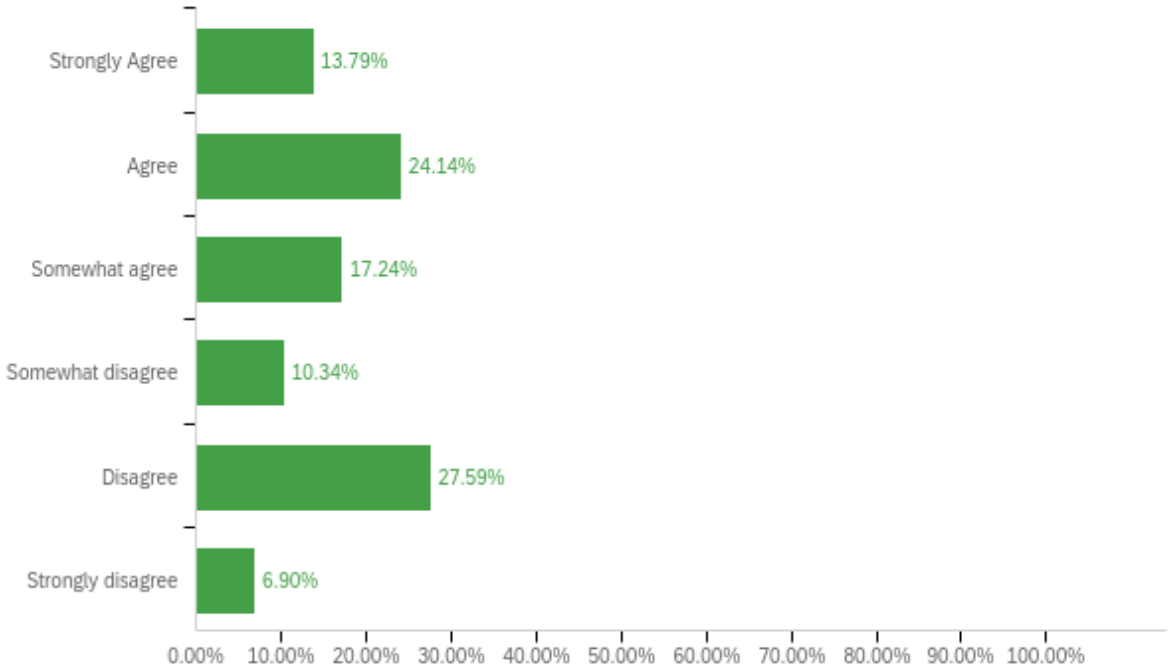
I think the campus green spaces (Botanical Gardens, Memorial Glade, Faculty Glade, Eucalyptus Grove, and other green areas on campus) are accessible to students with my condition(s).

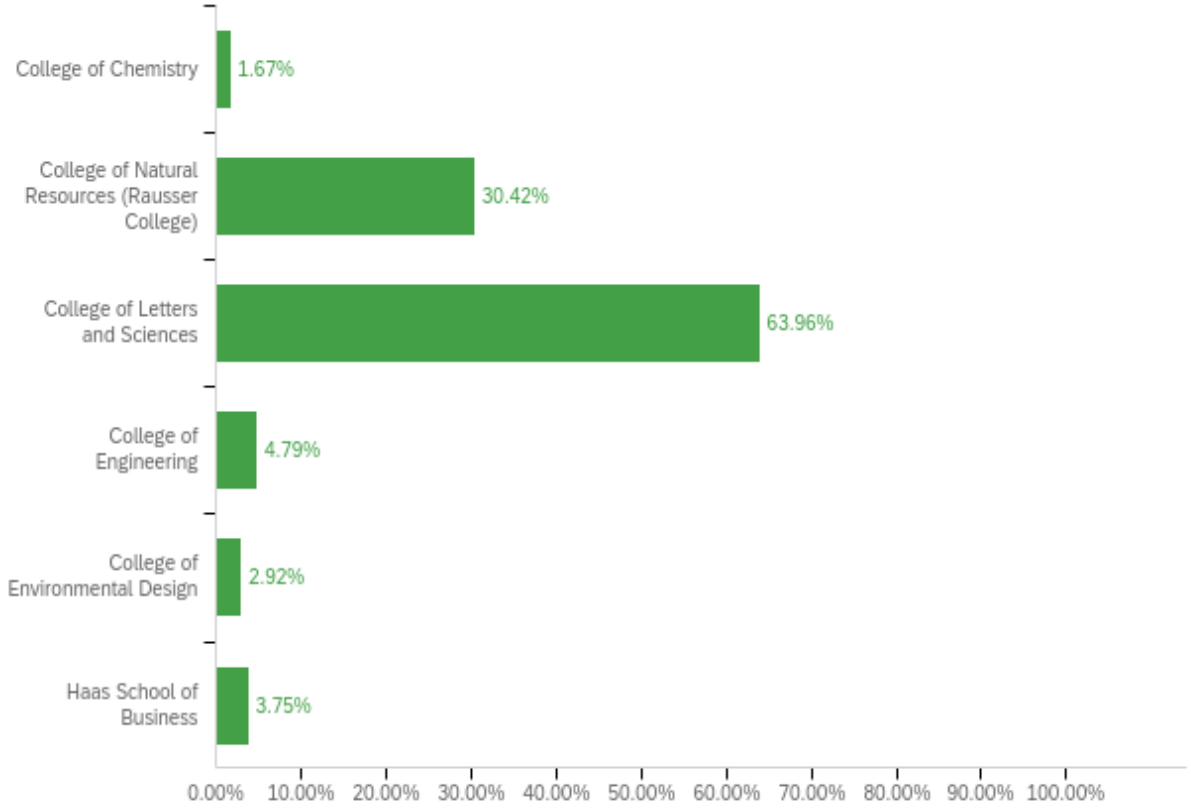


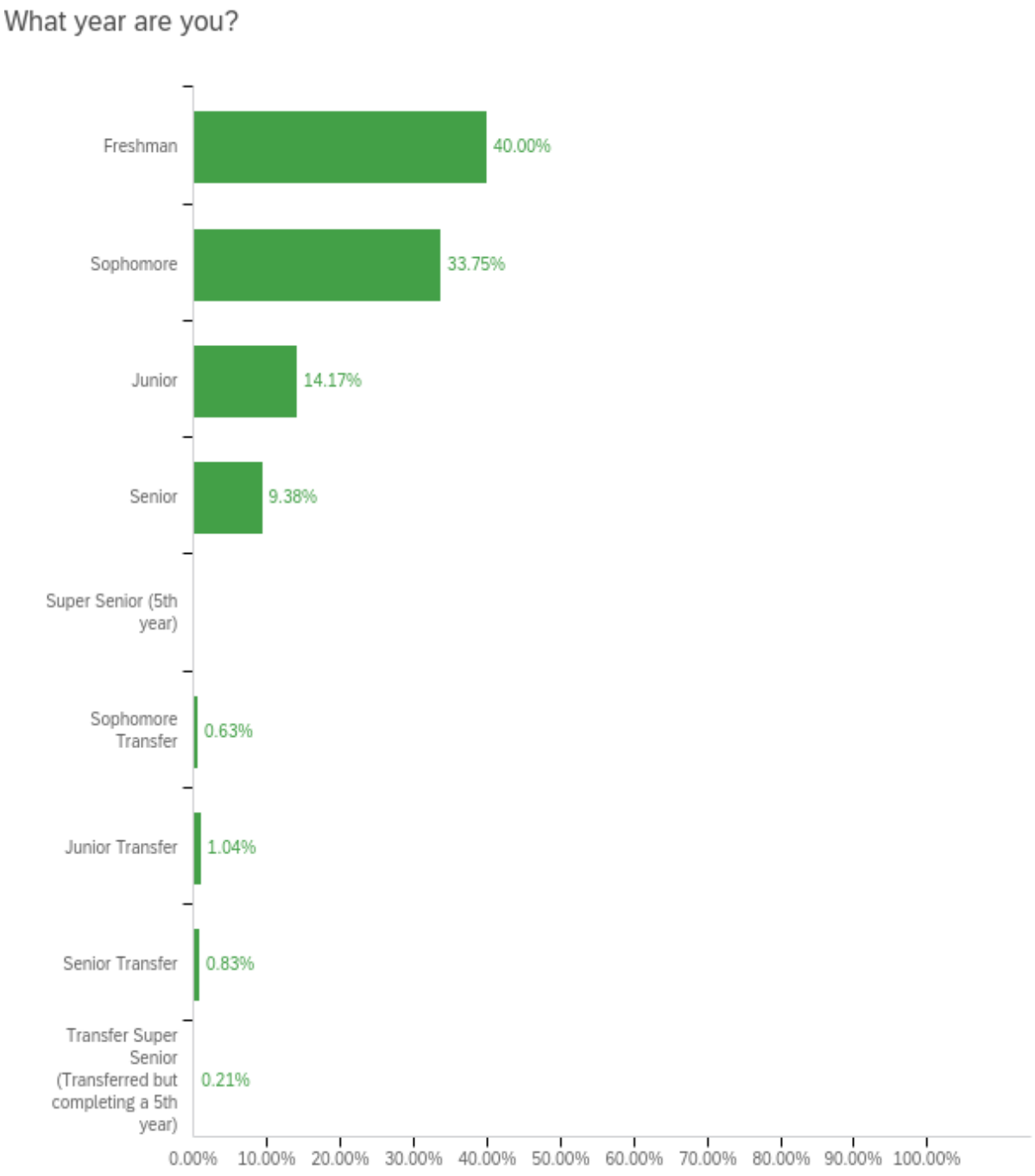
It is difficult for me to use and engage with outdoor campus spaces

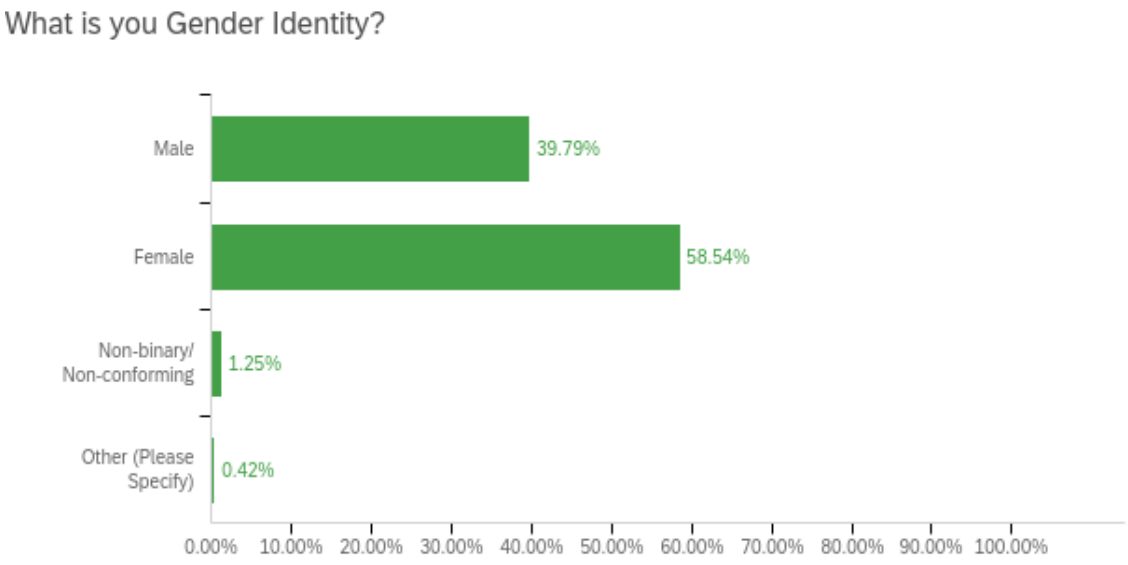


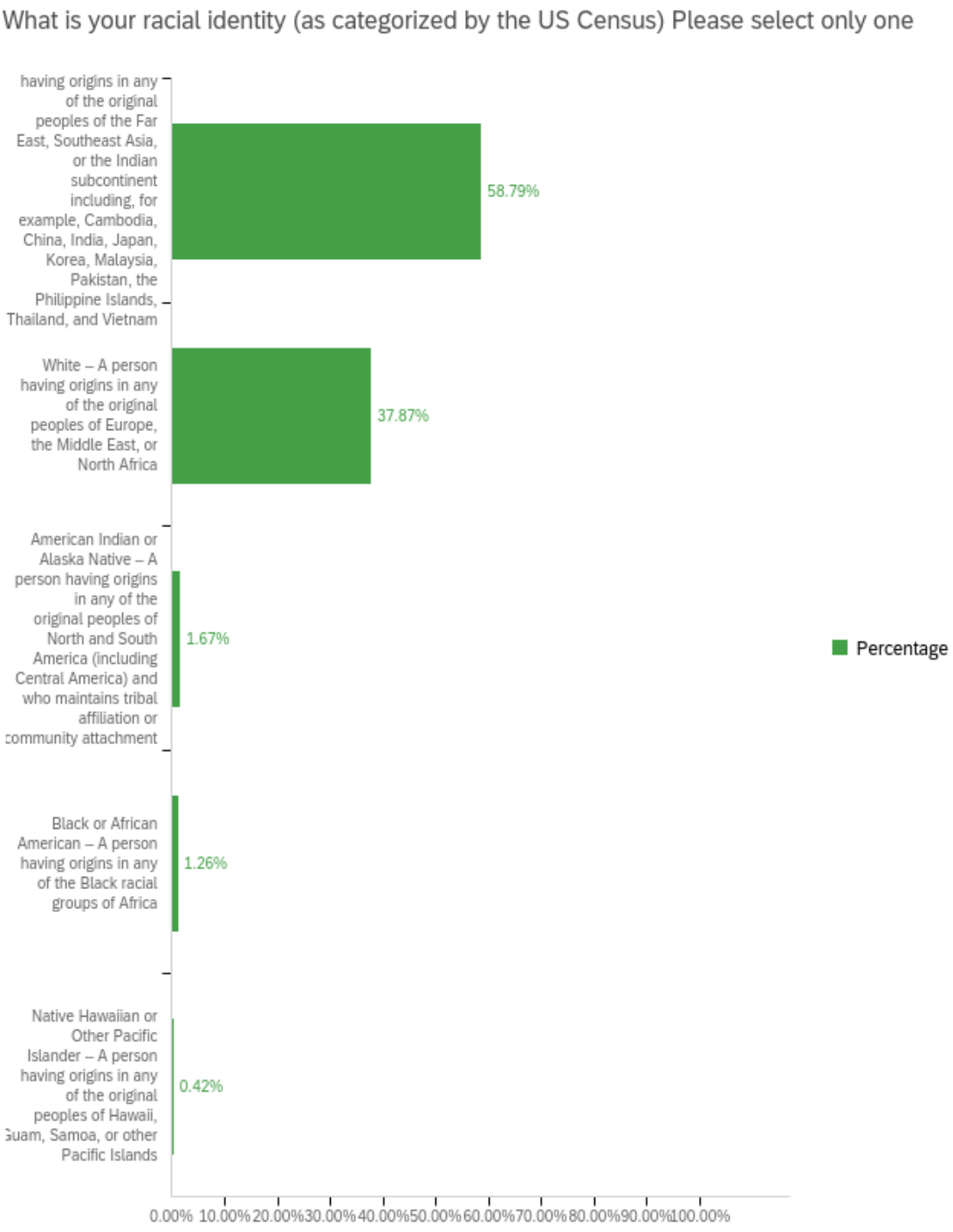
The university could be doing more to redesign its outdoor green spaces to be more accommodating and accessible to people with my condition(s).

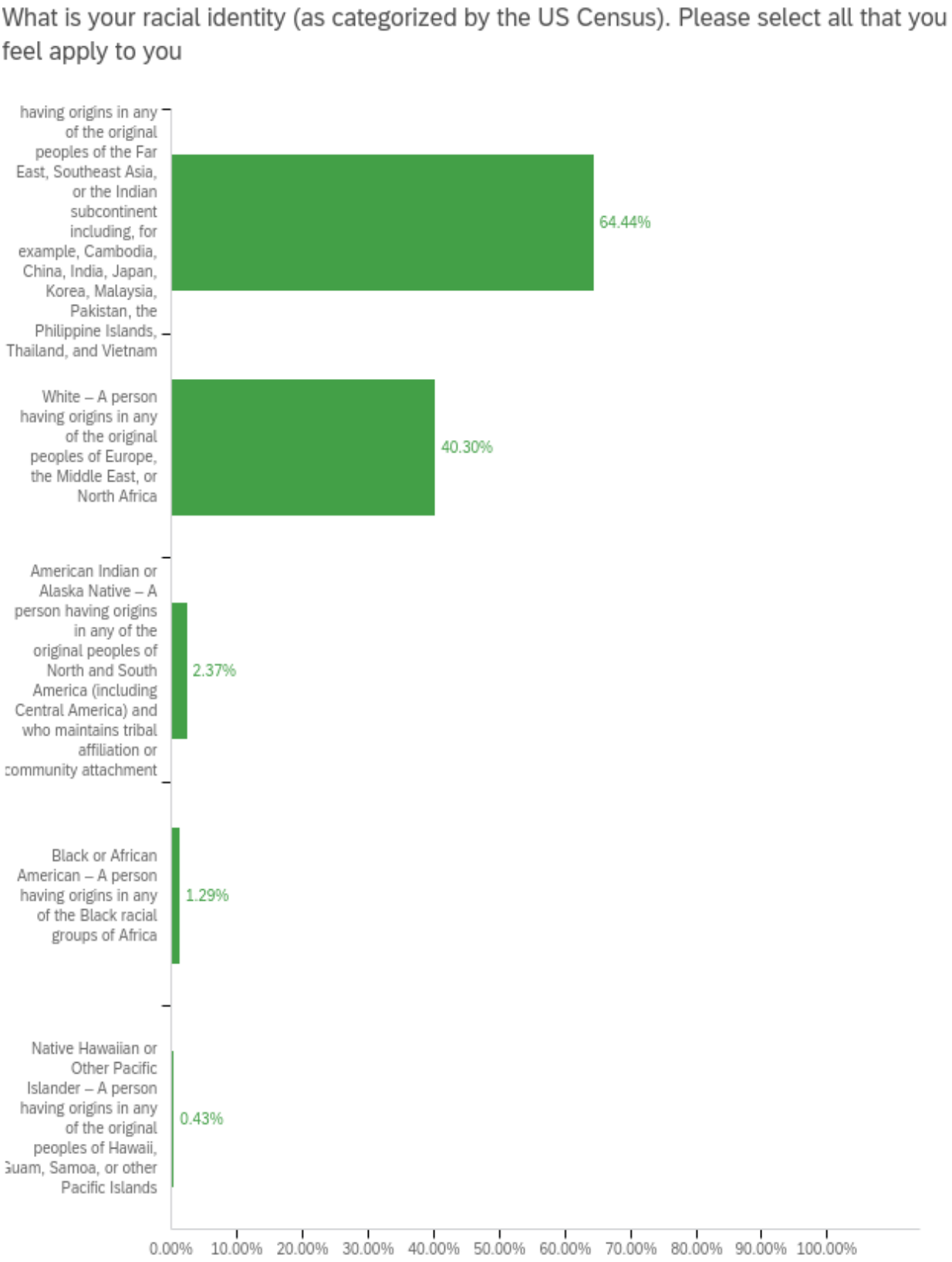



College of Chemistry
1.67%
College of Natural Resources (Rausser College)
30.42%
College of Letters and Sciences
63.96%
College of Engineering
4.79%
College of Environmental Design
2.92%
Haas School of Business
3.75%
0.00% 10.00% 20.00% 30.00% 40.00% 50.00% 60.00% 70.00% 80.00% 90.00% 100.00%

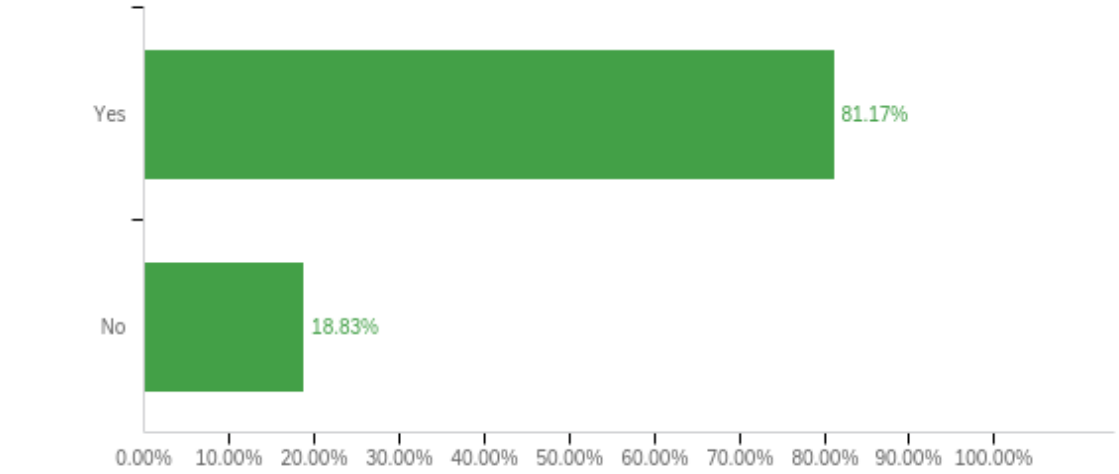

What year are you?
Freshman
40.00%
Sophomore
33.75%
Junior
14.17%
Senior
9.38%
Super Senior (5th year)
Sophomore Transfer
0.63%
Junior Transfer
1.04%
Senior Transfer
0.83%
Transfer Super Senior (Transferred but completing a 5th year)
0.21%
0.00% 10.00% 20.00% 30.00% 40.00% 50.00% 60.00% 70.00% 80.00% 90.00% 100.00%

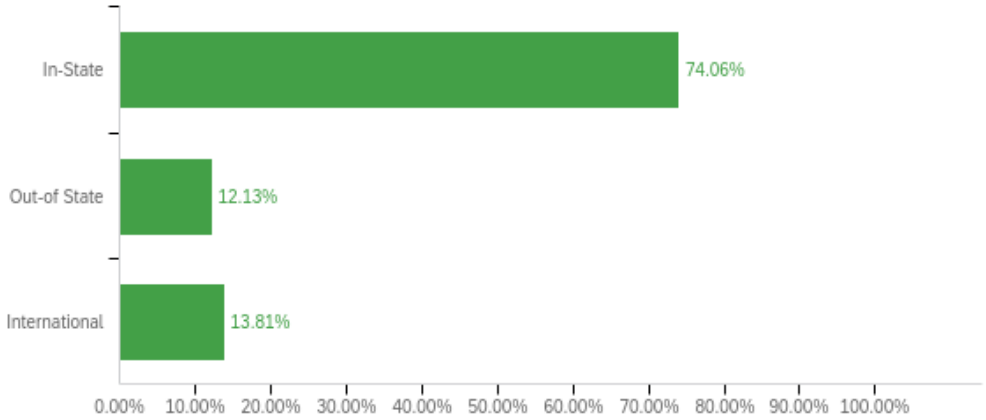

What is you Gender Identity?
Male
39.79%
Female
58.54%
Non-binary/ Non-conforming
1.25%
Other (Please Specify)
0.42%
0.00% 10.00% 20.00% 30.00% 40.00% 50.00% 60.00% 70.00% 80.00% 90.00% 100.00%


What is your racial identity (as categorized by the US Census) Please select only one
having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent including, for example, Cambodia, China, India, Japan, Korea, Malaysia, Pakistan, the Philippine Islands, Thailand, and Vietnam
58.79%
White – A person having origins in any of the original peoples of Europe, the Middle East, or North Africa
37.87%
American Indian or Alaska Native – A person having origins in any of the original peoples of North and South America (including Central America) and who maintains tribal affiliation or community attachment
1.67%
Black or African American – A person having origins in any of the Black racial groups of Africa
1.26%
Native Hawaiian or Other Pacific Islander – A person having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands
0.42%
0.00% 10.00% 20.00% 30.00% 40.00% 50.00% 60.00% 70.00% 80.00% 90.00% 100.00%
Percentage


What is your racial identity (as categorized by the US Census). Please select all that you feel apply to you
having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent including, for example, Cambodia, China, India, Japan, Korea, Malaysia, Pakistan, the Philippine Islands, Thailand, and Vietnam
64.44%
White – A person having origins in any of the original peoples of Europe, the Middle East, or North Africa
40.30%
American Indian or Alaska Native – A person having origins in any of the original peoples of North and South America (including Central America) and who maintains tribal affiliation or community attachment
2.37%
Black or African American – A person having origins in any of the Black racial groups of Africa
1.29%
Native Hawaiian or Other Pacific Islander – A person having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands
0.43%
0.00% 10.00% 20.00% 30.00% 40.00% 50.00% 60.00% 70.00% 80.00% 90.00% 100.00%

Are you a US Citizen?





What is your family's annual income? (Pre-COVID)